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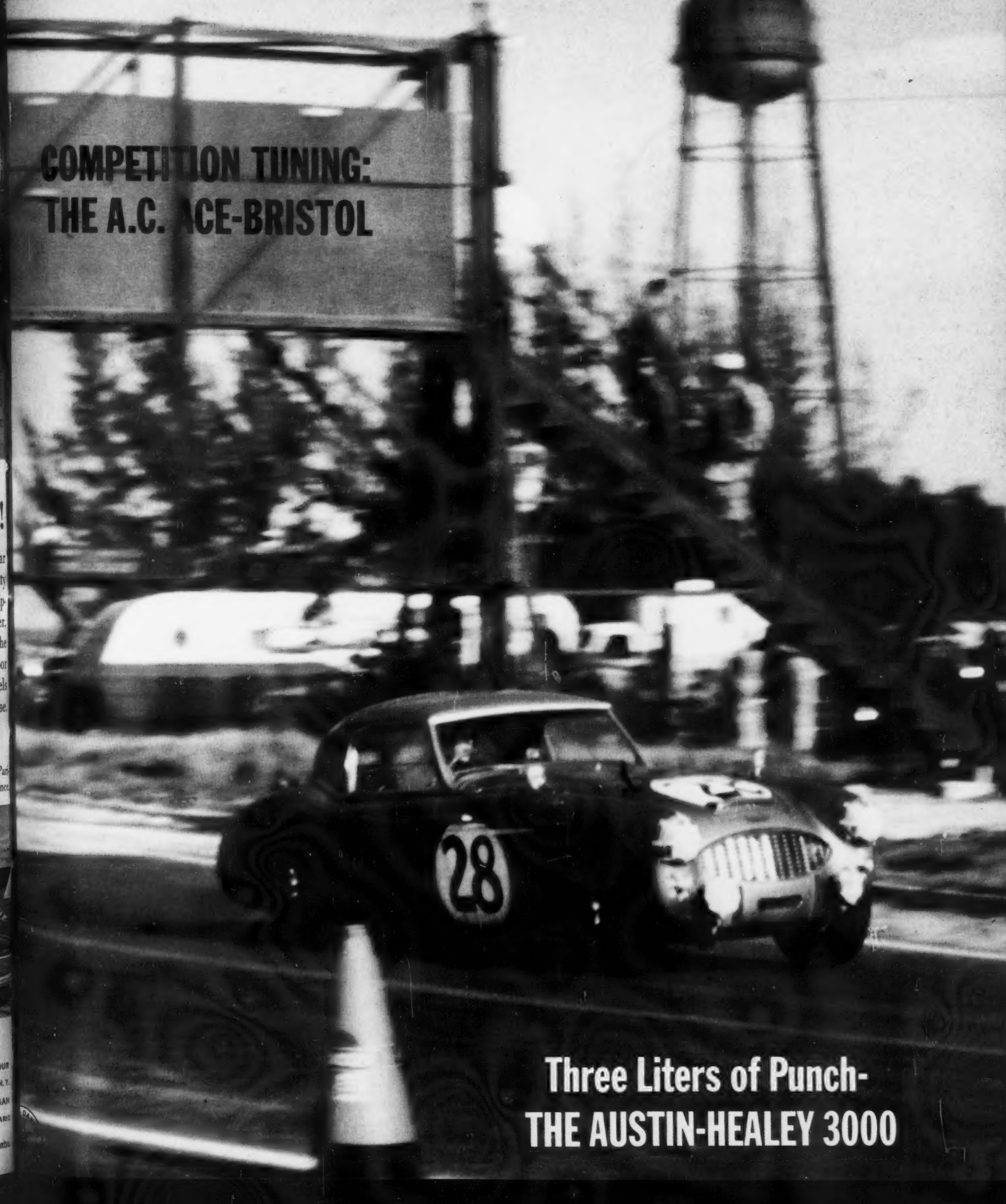
50¢ august 1959

sports · economy · competition



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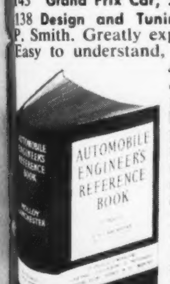


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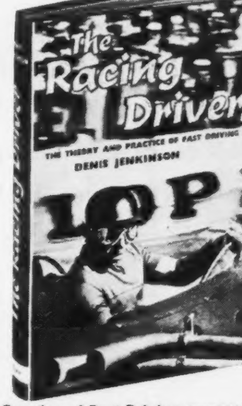


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*sports · economy · competition*

*August 1959 No. 14 Vol. 5*

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# very sincerely yours

► It is truly strange how this "speed kills" idiocy catches on. The latest form of the aberration to cross our desk was a news item from a Connecticut paper which told the story of a local judge's latest campaign for safety.

His honor has proposed that every car in the state be equipped with a governor which would regulate the speed potential of those cars to 60 miles an hour. That speed is the state's highest legal rate of travel said the judge. To implement the proposal, made to the state legislature, the good jurist suggested a $500 fine and six months' suspension of registration for any vehicle caught without the gimmick.

This is one of the most beautiful examples of double-think in the automotive safety line we've come across in many a day. What it amounts to in plain terms is manufacturing as well as legislating to the lowest common denominator. Further, it shows an appalling lack of technical knowledge on the judge's part. A speed-limiting governor not only limits the top speed of the car but its accelerative powers as well since it is not car speed but engine speed that is being governed. The lethal possibilities of a governed engine in a passing maneuver on an open highway are ghastly to contemplate.

In a way it is a typical, human reaction — one more typical of America than other places. It is the tendency to blame the machine, the road, the weather, anything but the right thing. In this case it is the machine that is taking the brunt when the real blame lies in the fact that, taken as a group, we Americans are lousy drivers.

It's a fact. In this country we license more incompetent vehicle operators (one hesitates to dignify them with the term "driver") than any other country in the world. Even in so-called "stiff" licensing areas — and Connecticut is one of these — tests for prospective operators are apallingly naive. The procedure among the "strict" testers is a written examination that virtually any moron could pass from sheer memory. The actual driving test would be laughable if it weren't for the number of absolute incompetents it turns loose on the public roads. Usually it consists of a couple of right and left turns, a stop or two and a parking test. If a prospect can get through this without hitting the panic button that person is thereupon given the privilege of operating a one to two-ton machine anywhere.

The net result is that the highways are loaded with people who are menaces at 30 miles an hour let alone 60. The proof of this and the major torpedo for all this "speed kills" nonsense lies in the fact that the greatest majority of the fatal accidents in this country occur at speeds *under* 45 miles an hour. Usually one won't find one of these licensed operators speeding. He or she is usually incapable of handling the car at any speed near the upper limit. All well and good up to this point. Unfortunately emergency situations occur and when they do the operator just plain isn't prepared for it. Conditioned by years of anti-speed slogans and cozzened into believing that slow driving is safe driving the emergency-confronted operator pulls the panic switch and an incident becomes an accident.

The only cure for any disease is to strike at the source and the source of any highway problem is the driver, not the machine. Tougher, far more realistic testing of prospects must be the order of the day. Less attention to paper tests and parking problems and much more to actual driving would weed out many of the incompetent operators. Tests should include a good stretch of upper speed limit driving on throughways and freeways, a bit of fast parkway traffic driving and some cross-town time. During these an examiner, if he's worth his salt, can sort out the dangerously inept and the squirrel as well. Knowledge of the local laws would make itself known. Poor reaction time would show up all along the way. This sort of testing is standard in other countries and it has paid off. Two car incidents in foreign lands usually stay incidents, they don't become fatal accidents.

They have discovered that it isn't the speed of the car that kills, it is the lack of speed of the driver that is lethal.

*—john christy*

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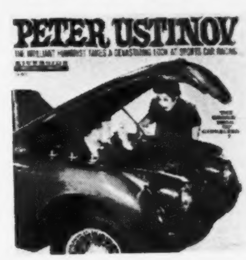


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# letters

### PORSCHE CHOICE

Right now I am in the process of transacting a deal to buy a new Porsche Convertible "D". However, I have one problem that I hope you can answer for me. Do you believe it would be better for me to get the 1600 Super engine ($250.00 more) or the 1600 Normal engine?

I decided to buy the Porsche for many reasons, but mainly to have a sports car with a little more built in comfort which my other car, a 1955 TR-2, did not have. I do not intend to use this car for any type of racing but just for normal everyday driving, rallies, and cross country trips. I was very much satisfied with my TR-2 and would like to have the same pickup, go and handling ability in the Porsche.

I would appreciate it very much if you can give me any suggestions at all regarding this matter.

Jerome H. Parmet
1/Lt. USAF
APO 231 New York

**The super is a bit quicker and a bit more "Sporting" than the normal. The normal has as its main advantage an utterly docile manner in city traffic. The choice is primarily one of use.**

### TRAFFIC SAFETY

All I can say is, "Hurrah and Hallelujah." J. D. Williams' *Comments on Traffic Safety* have brought to the surface many subconscious suspicions about quote 'driving safety' unquote which I (and I am sure many other readers) have felt.

"We regulate our lives to the whims of a traffic engineer" to quote a favorite phrase of a close friend of mine. How true. But, as Mr. Williams pointed out, this engineer (?) is not shocked at his own dictatorial and irrational behaviour, for he doesn't know what results.

I am sure many persons, after reading the article, feel, if not emotionally justified, at least logically justified, in sometimes exceeding the 'legal' (and often baseless) speed limits. As long as concentration of traffic, nature's forces, and human reactions remain relatively uncontrollable, then the establishment of absolutes in the way of speed limits, fixed-timed traffic lights, etc., is not only wasteful, but morally and intellectually wrong.

I congratulate Mr. Williams on his deep insight into the *real* problems of traffic safety today. I only hope that the local and state constabularies read and heed his fine suggestions.

George Young Jr.
Houston, Texas

How very refreshing to read J. D. Williams' logical and unemotional "Comments on Traffic Safety"! It is encouraging to note an increasingly enlightened attitude toward this omnipresent subject and the stirrings of a realization that increased highway safety cannot result from the strangulation of traffic and persecution of drivers.

Is there not some way that this article could be made required reading for all persons concerned with traffic control and law enforcement? Surely there are enough persons in position of power with sufficient intelligence to recognize the validity of Mr. Williams' theme and act in behalf of the long-suffering driver. As one among the many who are heartily sick of idiotic safety slogans, misdirected safety campaigns, ridiculous traffic laws, and multitudes of poorly located and ill-timed traffic signals, I would be glad to underwrite at least a portion of reprinting and distribution costs.

Congratulations to you for your fearless publication of an article that is bound to bring down the wrath of the misinformed do-gooders, and to Mr. Williams for recognizing the pure light of truth in a wilderness of opinionated nonsense, illogical falsehoods, and twisted statistics.

Philip H. Jensen
Philadelphia, Pa.

### Q-SHIP TR-10

I just took delivery on a new 1959 Triumph TR-10 Wagon and so far have only 100 miles on it, but it seems to be what I was looking for.

My true concern is, *where in the heck do you get it?* I am speaking of the power kit described in the article, "Q Ship TR-10".

I have asked my dealer, plus the one other dealer here in Dayton. They don't know anything about a power kit for the TR-10 for $150.00 complete. The only one they seem to know about costs around $400.00. What gives?

James R. King
Dayton, Ohio

**The kit is not stocked by dealers due to the small demand for it. But it is available from Triumph distributors, and the price is $150.**

### BILL KRAUSE

The article in your June issue about Pomona Grand Prix smells. The article stated, ". . . D Jag driven by Ron Flockhart, the machinery was strictly small bore". Well, if Bill Krause drove his own D Jag instead of letting Phony Flockhart, he could have won. Flockhart isn't all what he is cracked up to be. Nobody had to leave the way open for Bill Krause, even if Gurney hadn't have blew, Bill would have caught him. Ken Miles did not see Krause's tire going, it was impossible for him to see. You didn't say anything about Krause's ability and determination. Nobody gives him credit for driving a beautiful race. He's the best driver around *anywhere*. Someday you'll see Krause the top driver of all time. I'm sick and tired of you people yapping your mouths about the other drivers. Say something about Bill Krause. Because someday you won't be able to keep him out. Bill Krause is a great guy besides being a great driver. He never brags about himself, so I'll do it for him.

Mrs. Bill Krause
N. Long Beach, Cal.

### JAGUAR CLUB

The Jaguar Clubs of North America, Empire Division is having a membership drive. Anyone interested in joining this or-

ganization please contact Margaret Tench, 7 Bond Street, Great Neck, N.Y. for information.

Jaguar Clubs of North America
Margaret Tench
Empire Division Director

### PORSCHE PERFORMANCE

Found "Twin Cam For Competition" (June SCI) very, very interesting and enlightening and feel sure will be of great interest to all enthusiasts.

I note you plan this series for Triumph TR-3, Austin Healey 100-6, Alfa Romeo and AC Bristol. It seems to me that already much has appeared on permissible tuning in SCI on the Austin Healey and Alfa, but nary a word on what might be done to improve "legally" a 1958-9 Porsche Super Coupe. Here is a truly fine motor car, which owing to its quality, workmanship, streamlining, and understressed engine, which I believe could be legally tuned to rev up to about 6500 without danger provided it was driven intelligently.

What a performer this legally tuned Porsche would be for fast long distance touring, and also be eligible besides for some production sporting events. On some circuits I believe it would be a headache for Carreras!

Why not include a Porsche Super Coupe in this series?

John Weiner
New York, N. Y.

**We have a Porsche Super preparation in the works now. Be patient.**

### MYSTERY SOLVED

Would you explain these terms which were used in Racer Brown's article, "Prescriptions for Performance": magnafluxed, x-rayed, and shot peened.

Would you also explain why American V-8 engines traditionally have strokes shorter than bore diameters, while American and European in-lines go in the other direction with longer strokes than bore? If any condition, (over, under, or just plain square) is preferred when designing an engine, why don't more engines have similar layouts?

Paul Newcum
Brookfield, Ill.

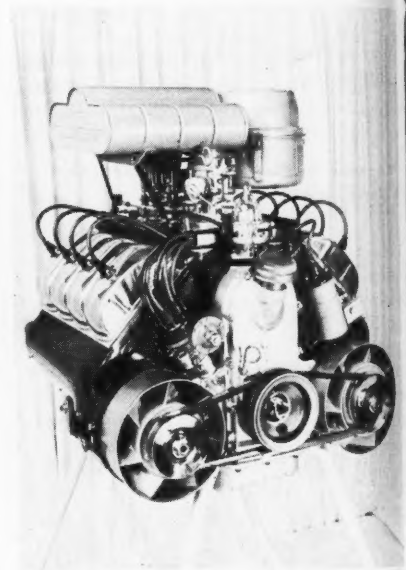
**Magnafluxing is a process whereby surface cracks and fatigue are indicated. To discover internal flaws such as bubbles and cracks, it is necessary to x-ray the part. The process of shot-peening involves blasting the piece with small-diameter lead shot. This serves to "knead" the surface in order to relieve stresses left by the forging or casting process.**

**Early European engines were taxed on a formula based in part on bore size. For this reason, engines were designed using small bores, with long strokes necessary to maintain displacement. The advantage of an oversquare engine, (bore larger than stroke) is that for any given engine size and rpm, the piston speed is reduced. There is a limit to bore diameter dictated by the resulting piston size (and weight) and the need for proper combustion chamber design. It will be noted that modern in-line engines, both European and domestic, are more over than under squâre.**

# technotes

## AIR-COOLED V-8

Rumors from Detroit fly thicker and faster. There is talk now that GM will build V-8 engined "compact cars" in addition to the much rumored flat-six rear-engined Chevy. The illustration shows what might be done, it's the air-cooled aluminum V-8 for the Tatra, a Czechoslovakian car which Jesse Alexander tells us is reserved for high party members and government officials. The car itself is also of interest for the 2½ liter engine is fitted in the rear. Tatra has been building them this way since 1934. Tatra's Dr. Hans Ledwinka is held by some to be as near a genius as Dr. Ferdinand Porsche. Their paths crossed many times during their careers and they evidently exchanged many ideas. Certainly their outstanding creations bear many similarities — rear engines, extensive use of aluminum alloys, swing axles and platform frame are but four of the features shared by the VW and the Tatra. Today, alas, engineers are more specialized and less publicized.



## CHEVROLET

Is it really true?
Will the '60 Impala be all gnu?

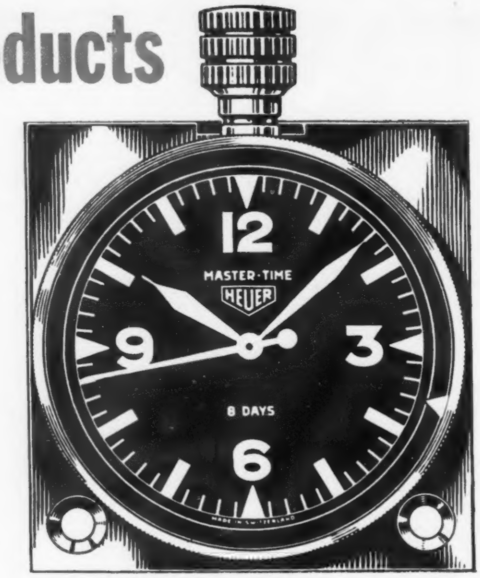
## SELF-HELP DEPT.

Our current thinking on the intriguing dual streaks achieved with the Positraction-less Chev is that during the last of the single-wheelspin runs, the shaft of one of the sun gears became welded to the differential casing. Until this flimsy weld broke free, we had a completely locked-up rear end. This might also explain the queasy feeling we experienced during the top speed run — the one where a faulty fuel pump held us to a mere 122.

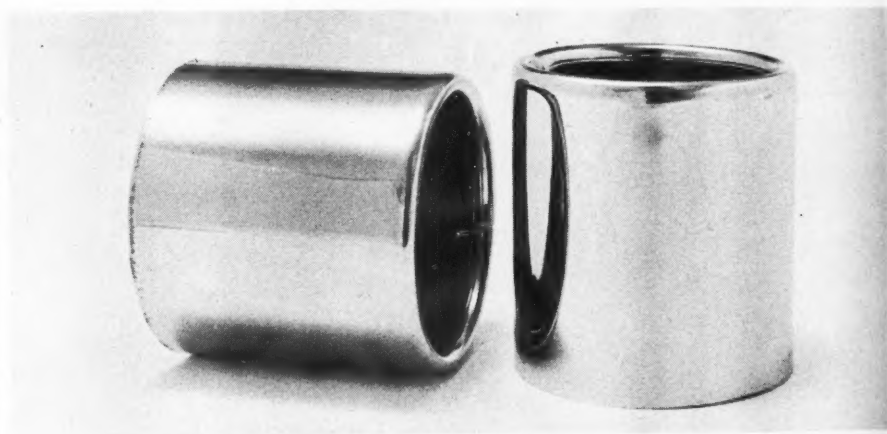
## FULLER PHIL

If the Fuller Brush man knocks on your door don't send him away too quickly. At least, not before you can grab one of his new catalogs. Why? Because half its pages feature a biographical sketch of Phil Hill, complete with many full color photos. The story is by Denise McCluggage, oft-time SCI contributor.

# new products

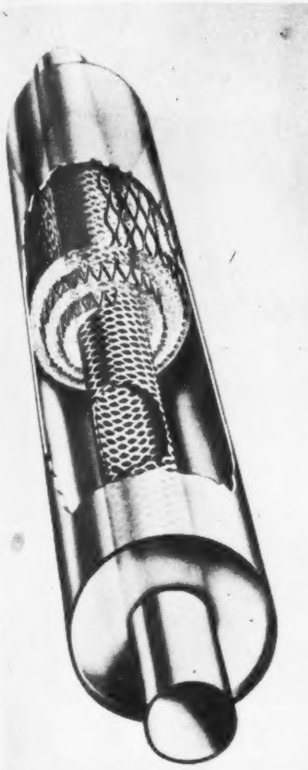



An eight-day dashboard clock with a sweep second hand is available from Heuer Timer Corporation, 441 Lexington Avenue, New York 17, N.Y. Known as the "Master-Time", this 15 jewelled watch has a "hack feature" which stops the movement when the winding knob is pulled out, enabling the operator to synchronise the clock to the nearest second with the judge's control watch. Price and information may be obtained from Heuer.

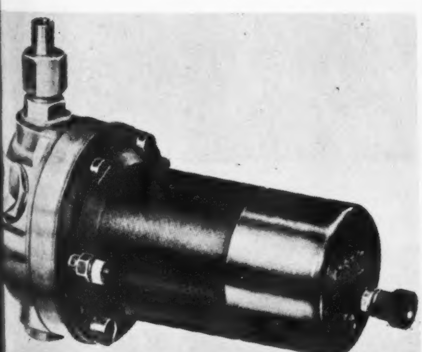


A practical and attractive accessory for Corvettes are these exhaust tips available from Jay's Sports Car Accessories, 6055½ Melrose Avenue, Hollywood 38, California. Priced at $4.95 per set, the units are made of 1/16" steel and chrome plated.

A license-free communications system has been made available in kit form by Heathkit. The Citizen's Band Transceiver Kit may be operated by any citizen over eighteen years of age without the need for passing tests, exams, etc. The kit comes complete with microphone, station identification card, all pertinent FCC regulations and application forms, a sheet of adhesive backed letters and numbers to affix call letters, and a crystal of appropriate frequency. Accessory antenna and power pack converts the unit for mobile use. Price of the basic kit is $42.95 from Heath Company, Benton Harbor, Michigan.



Replacement mufflers of the straight-through type are supplied for all imported cars by Bakers Worldwide Auto Parts, Inc., P.O. Box 57, Franklin Square, N.Y. The Servais muffler is constructed of steel and is packed with fiberglass. The straight-through design uses a steel honeycomb core which allows free flow of exhaust without excessive noise. Prices vary depending on model.



To meet the ever-growing demand from imported car owners, Columbia Motor Corp., 419 East 110th Street, New York, N.Y. is now importing a steel bodied high-precision electric fuel pump as a replacement part. The pump is manufactured by Harting, a West German fuel pump manufacturer. The pumps have fixed contacts that can neither swing sideways nor get out of adjustment. All Harting pumps are equipped with double-contacts ensuring longer life. Write to Columbia for dealer list and prices.

# newsletter from Europe

With the end of the controlled administration at Maserati things might be looking up for their racing department. That portion of the Maserati industrial complex that deals with automobiles is again under the direction of Adolfo Orsi and Omar Orsi. This father and son combination is well known for its love of fast, trident-adorned automobiles. Still another clue as to upcoming Maser activity is the recent testing of the new "Bird Cage" 2,000 cc sports car by Stirling Moss at Modena. His rate of progress — in an untried machine — was between 80 and 85 mph. Not an unhealthy average all things considered.

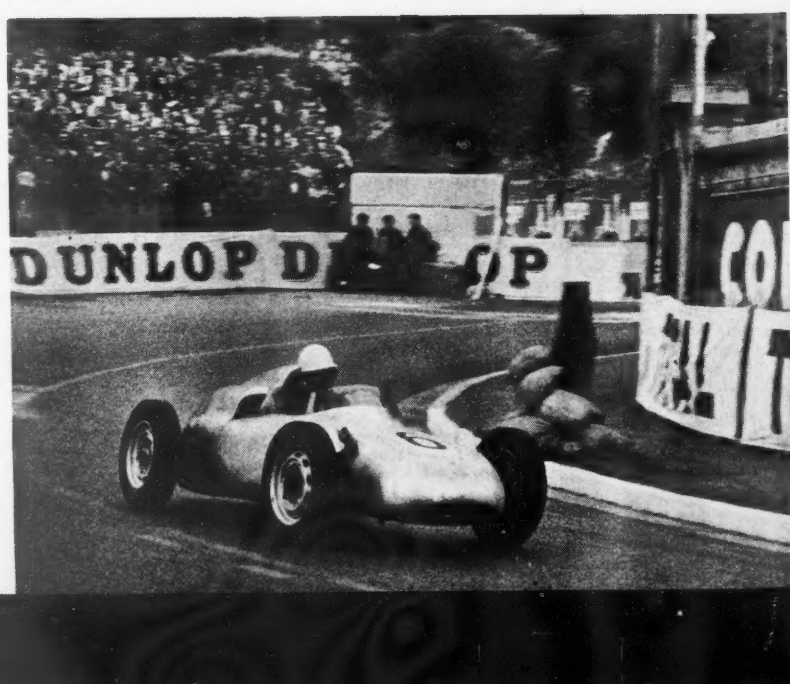
The Colotti-designed gearbox/final drive unit used on the Cooper Formula 1 cars this season seems to have eliminated the cog problems that beset the older cars using Citroen-based gearboxes. The new box has five forward speeds and reverse, and is housed in a beautifully ribbed, light alloy case cast by Amadori. Who, by the way, also produce electron wheels for OSCA and others. The Volvo Company will introduce a new two seater sports coupe sometime next year. Power will be the long-used 85 hp, 1,582 cc unit as fitted to the current 122 S model. Body work is very Italian-looking — complete with an egg-dicer grille. The prototype has a wheelbase of 8-ft ½-in, and is 4-ft 3-in high. Disc brakes will be standard equipment along with hide upholstery sporting

*(Continued on page 17)*

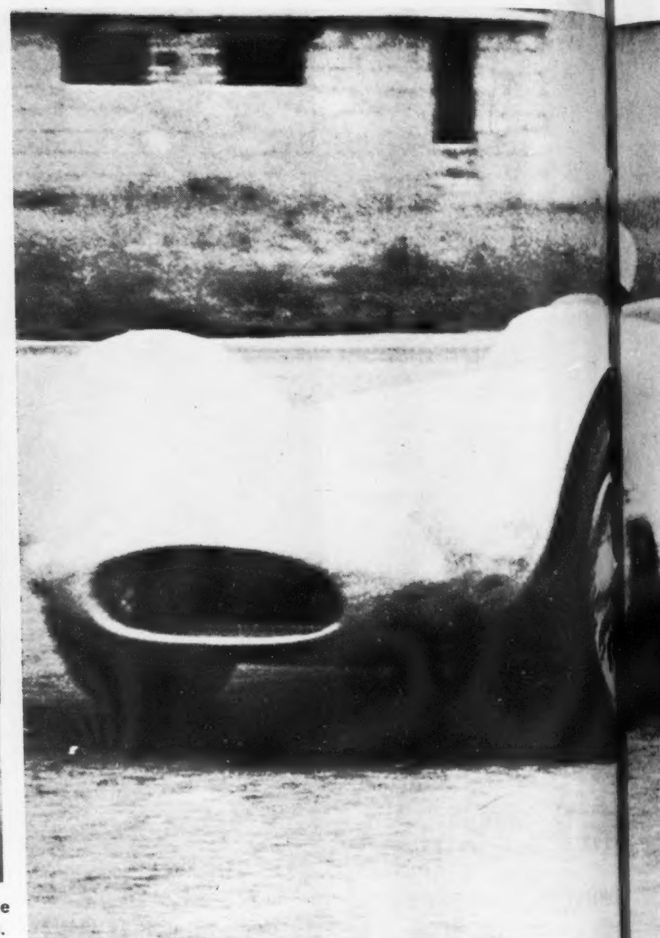
The new Volvo prototype two-seater sports coupe.

Interior of the Volvo sports would do credit to a Kalifornia Kustom.

Typical tail-out attitude of the Porsche Formula car at Monaco.



Stirling Moss looks over the opposition in the form of the Porsche single seater at Monaco.



Stirling Moss bends the new Maserati around Modena Autodrome.

EUROPEAN NEWSLETTER
*(Continued from page 14)*

so many pleats that once inside it gives the impression of a cow's interior. Price in the US at the present writing is quoted at around $2700. This last will probably change by the time the vehicle gets into production. Body pressing for the new sportster will be produced by the Pressed Steel Company in England, and the car will be assembled there from Volvo-manufactured components.

The new Aston Formula 1 car surprised all engaged in the project by a particularly trouble-free testing period. Its road-holding seems to be superior to most of the Formula cars now running. It is a pity that the car has only two seasons to run. Its promise, however, may persuade David Brown to stay in the out-and-out racing car business.

The Porsche Formula II car — first run at Monaco — is an impressive piece of engineering. Utilizing the A-frame rear suspension seen at Sebring the single seater does away with the fairings over the wheels, and places the pilot in the center of things. The tach reads up to 10, and the Porsche mechanics warm them up at a solid seven! Seven, by the way, is one more than the number of forward speeds in the Formula 1 Porsche gearbox. They sound like Gilera racing bikes as they go up through the gears. Speaking of things Porsche — the latest in the passenger line is the new 1600 Carrera De luxe Next month a full SCI test on this new model.

# pipeline

Charles Moran, chairman of the Automobile Competition Committee for the United States, has announced that the three leading countries in motor racing have agreed in principle on the new Intercontinental Formula.

The proposed specifications for the formula are:

— An engine size of 3.8 liters for 1960 and 1961.

— Six races, two for each country, (U.S., England, Italy).

— Alcohol fuels will be allowed, at least at the beginning, for those cars which find it essential in operation.

— Indianapolis (May 30th) and a new April date will be logical choices for the U.S.

— The formula will go into effect in 1960.

The new formula was motivated by the FIA decision to reduce the formula for Grand Prix racing from 2.5 to 1.5 liters as of January 1, 1961. This move eliminates big cars from international competition, and since the United States, England and Italy have cars less suitable for the new formula they called the meeting in London to agree on the Intercontinental Formula.

■

Volkswagen is, according to well founded sources, going to build a car somewhat along the lines of the new A-40, in addition to the regular line of beetles and transporters. A two-pedal control system is also coming up, as is low gear synchro.

■

With announcements from Detroit's big three on the names that have been selected for the much-rumored "small" cars comes late information on the vehicles themselves.

Chevrolet's Convair is far and away the most unorthodox of the three. Its use of an air-cooled six-cylinder "pancake" engine would be enough of an innovation for a domestic product, but the fact that it is rear mounted makes for really far out specs. Displacement is between 140 and 145 cubic inches, with a horsepower rating between 90 and 95. An all up weight between 2200 and 2300 pounds would give it, with its almost 100 horsepower, adequate acceleration and cruising speed for turnpikes or traffic driving. Suspension is independent all the way around by coil springs. Overall length is 170 to 180 inches, while the wheelbase is 107 inches. The car will be available with a manual three-speed transmission or a modified Powerglide. A more remote possibility is a four-speed floor shift based on the Corvette box as an extra cost option. Price of the complete package is tentatively pegged to average out at $2,000 delivered.

■

Not too much is known about the Chrysler Valiant only because development work was started later than that of the other two cars. It is the most American-looking of all three with the longest overall length 190 to 195 inches. A good portion of the rear overhang is taken up with a slight FIN treatment. Its external appearance suggests a 1956 Dodge or Plymouth. Power will be supplied by a new overhead valve six, that will be shared with the big Plymouth in 1960. Displacement will be in the neighborhood of 160 cubic inches, while transmission options will be the same as for the Convair.

■

Ford's new Falcon—they beat Chrysler to the new name by 20 minutes—will look like a 2/3 scale version of the FoMoCo big cars—lots of glass—not at all boxy like the current line, but rather swish looking like the current Buick or Pontiac—definitely not squared-off with sharp edges as today —flat hood extending onto fender tops—fenders smooth, even at front as headlights will be somewhat inboard in the grille — (remember the Nash in its last years?) —very little trim on the Ford itself, quite a bit on the others—anticipated sales volume on the Falcon is about equal to that of the Mercury.

The six-cylinder engine will be very close to the current overhead valve power plant, and should produce about 85 horsepower from 160 cubic inches.

■

SAAB is making plans to go nation-wide, hoping to double expected '59 sales during 1960. To be announced this fall is a seven-passenger station-wagon with 100 more cc's (841) and a Z-F four-speed gearbox. Latter item to be offered soon on the 750GT, too.

■

By the time this is being read, Le Mans will have been run, but it's still news as we write it. Ferrari are running in vast numbers. Three-liter *Testa Rossas*, three-liter Gran Turismo *Californias* with *Testa Rossa engines* (both with disc brakes), two-liter *Dino* V-6 with single cams per bank (sort of a 250GT sawed in half), and if the right customer steps up and lays down his dough-re-mi, a 4.9-liter Second Series *Superfast* coupe. Zow. Looks from here like a Ferrari walkover on overall distance. The two-liter class will be the real battleground, that and the handicap race. Lots of Lotus, Porsche aspirations here, too.

# coming events

| | |
|---|---|
| July 18<br>Northern N. J.<br>Region Rally | |
| July 18<br>Chicago Region<br>Gymkhana | Wilmot, Illinois |
| July 18<br>Atlanta Region Rally | |
| July 18-19<br>New York Region Race | Thompson, Conn. |
| July 18-19<br>Central Florida<br>Region Race | Ft. Pierce, Fla. |
| July 18<br>USAC 100 Mile<br>Sprint Car Race | Raleigh, N.C. |
| July 18-19<br>USAC Sports Car Race | Marlboro, Md. |
| July 18-19<br>Delta Region Race | Hammond, La. |
| July 18<br>Grand Prix,<br>Royal Auto Club | England |
| July 20-21<br>10 Hours of Messina,<br>Sports Car Race | Italy |
| July 23-27<br>Adriatic Rally | Yugoslavia |
| July 25-26<br>Philadelphia Region<br>Race | Vineland, N.J. |
| July 25-26<br>New England Region<br>Nantucket Gymkhana | |
| July 25-26<br>Savannah Region Rally | |
| July 25<br>USAC Sports Car Race | Limerock, Conn. |
| July 26<br>Freiburg Hillclimb | West Germany |
| July 26<br>Grand Prix de Bari | Italy |
| July 30-August 1<br>Northeast Penn Region<br>Giants Despair Hillclimb | |
| August 1-2<br>Northwest Region<br>Seafair Races | Shelton, Wash. |
| August 1-2<br>USAC Sports Car Races | Elkhart Lake, Wis. |
| August 2<br>Grand Prix of Germany | Nurburgring |
| August 3<br>Grand Prix, sports, touring | Brands Hatch, England |
| August 3<br>Grand Prix, sports, touring | Mallory Park, England |
| August 8-9<br>New York Region Race | Montgomery, N.Y. |
| August 8-9<br>New England Region<br>Gymkhana | |
| August 8-9<br>Chicago Region Races | Wilmot, Ill. |
| August 8-9<br>USAC Sports Car Race | Virginia Int'l Raceway |
| August 9<br>F.III, sports, touring | Karlskoga, Sweden |
| August 9<br>Trapani-Moterice<br>Hillclimb | Italy |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FIAT ABARTH 750 single camshaft
Bore and stroke 61 x 64 • Maximum power 44 HP • Consumption over 39 miles per U.S gallon • Maximum speed over 92 miles per hour
FIAT ABARTH 750 Dual-camshaft
Record Monza
FIAT ABARTH 750 Dual-camshaft engine expoded view of the engine
Bore and stroke 61 x 64 • Maximum power 61 HP • Consumption over 28 miles per U.S gallon • Maximum speed over 112 miles per hour
ABARTH
TURIN - ITALY

# MOST EXPENSIVE VICTORY

*by Federico B. Kirbus*

► TWENTY years ago, two sleek little 91 cu. in. racing cars placed 1-2 under the hot sun and swaying palms of Tripoli, and thus scored perhaps the most expensive victory in auto racing history — for these costly little gems, specially built for that race, were never used again. Before they had another chance for an airing, war broke out, and after it, they spent years tied up with legal bothers while the 1500 c.c. formula waxed, waned, and finally withered away.

But let's start at the beginning:

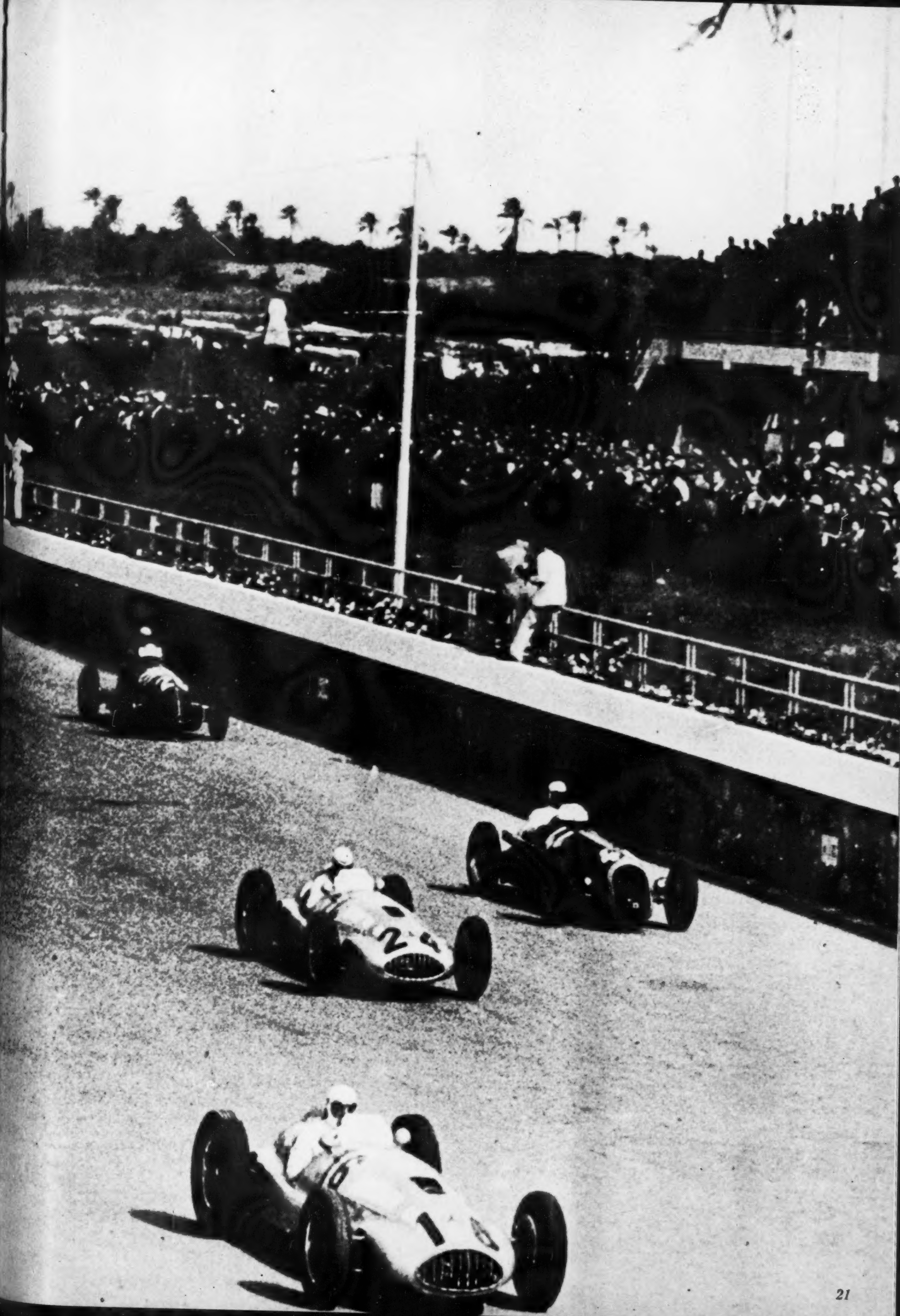
In 1934, Italy's traditional domination of Grand Prix motor racing had been taken over by the Germans, with their 750-kilogram cars first and then, in 1938, with their 3-liter jobs. After a while the Italians almost gave up trying and instead converted to the 1500 c.c. (91 cu. in.) "voiturette" (small-car) formula which had sprung up some years before, and was at the time being contested between Maserati, Alfa-Romeo, and the British ERA.

One of the traditional Grand Prix races of the time, and one which the Italians valued intensely, was the Tripoli Grand Prix, held on an ultra-fast circuit in Mellaha, which winds round a salt lake near the town of Tagiura in Northern Africa. Due to the wide, open curves the old Mellaha circuit was not only ultra-fast but very dangerous — a real seeder of men from boys. Here the Germans had enjoyed uninterrupted supremacy since 1935, and for the '39 event the Italians wanted to be sure they got their race "back". So, knowing that the Germans had no 1.5-liter car available, they decided to make a surprise switch from the Grand Prix to the voiturette formula. Thus their Maseratis and Alfas — which were by this time leaving the ERA far behind — would have an almost no-contest win.

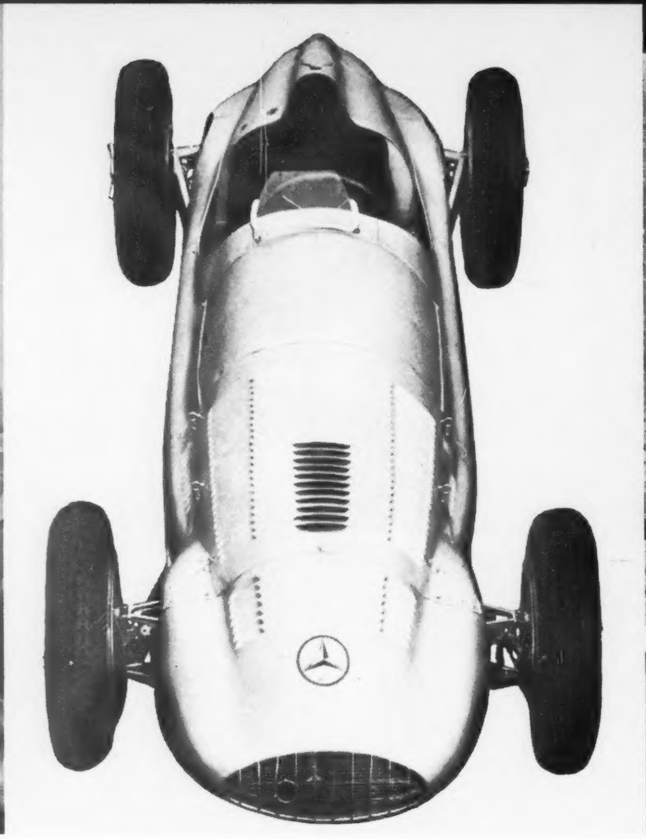
It didn't work out that way, though. By September, 1938, the Mercedes-Benz team already knew that the Tripoli race was to be a 1500 c.c. clambake. Luckily for them, they had some time ago drawn up plans for a small-capacity racer, although they had no intention of building it just yet; but when they heard of the formula switch, they reckoned that if they succeeded in pulling *this* one off, any lingering doubts about their technological superiority would be banished. Work began at fever pitch in the Mercedes racing department in Untertürkheim. Herm[ann] Lang, in his autobiography "Grand P[rix] Driver" (as translated by C. Meisl) sa[ys] ". . . in the 'secret' shop of the [racing] department (which was surrounded [by] barbed wire) something special was bein[g] cooked up, to surprise the world of moto[r] sport. Although I was frequently at [the] factory, I did not know what it was . . . Later, however: "Before saying good-b[ye] Kraus allowed me to look into the 'secre[t]' shop. What I saw there was more than ju[st] interesting! I decided, however, to kee[p] the information to myself, as our o[p]ponents could draw conclusions from ev[en] casual remarks . . ."

The Italians were meanwhile blissful[ly] unaware of what was going on. On Fe[b]ruary 24th, 1939, they received a rude jo[lt] when journalist Charles Faroux cable[d] his paper, L'Auto, from Berlin, statin[g] that after night and day labour in Stut[t]gart, two 1500s were ready for testing an[d] if all went well, the cars would be on th[e] starting line at Tripoli. Tests would b[e] carried out in March, Faroux added. Thr[ee] days later, the Italian press ridicul[ed] Faroux's report. It was impossible, th[ey] said, that Mercedes could have desig[ned]

(Continued on page 2



Rudolph Caracciola, who drove one of the Mercedes to second place in Tripoli G.P.



The 1939 1½ liter Mercedes looked like a scaled-down version of the '38 W-163.

Hermann Lang in the W-165 at Tripoli, the only race in which it ran.

and built a racing car in so short a time — eight months! March went by with growing uneasiness all round. *Was* there a 1500 Mercedes, or *wasn't* there one?

Meanwhile the drivers were called to Stuttgart by telegram, and, once there, they were bundled into cars and rushed off to Hockenheim, where a motorcycle circuit existed. There they finally saw the sleek little racers. At the same time Mercedes finally released the information that the cars existed. Only three days remained before the closing of entries and the cars hadn't been tested yet. The Italians kept cabling Mercedes frantically demanding to know if they were coming or not. The slightest snafu would have upset everybody's plans.

The cars were beautiful little twin-o.h.c. V8's, with two-stage super-charging by two Roots-type blowers, the gearbox mounted in unit with the back axle and de Dion rear suspension. Power output was around 265 bhp at 7,800 rpm. The one car taken to Hockenheim for tests, worked perfectly and its performance was incredible. Caracciola and Lang went round and round and the little silver car went faster and faster until finally the signal to stop went out and the tests were over — successfully over. Immediately the news flashed round the world. Mercedes had confirmed their entry for the 1½-liter race at Tripoli! The race was to be held on May 7th, but the organizers wanted to have definite entries a long time before in order to organize their sweepstake, where fabulous fortunes could be won for a few cents. On April 11th, the Federazione Automobilistica Sportiva Italiana published the finalized entry list: two Mercedes (Lang, Caracciola); six Alfa-Romeo "Alfette" (Farina, Biondetti, Emilio Villoresi, Severi, Pintacuda, Aldreghetti; four works' Maseratis (Trossi Luigi Villoresi, Cortese and Rocco), and a number of independents on Maseratis; Taruffi, Ruggieri, Castelbarco, Capelli, Balestrero, Ghersi, Teagno, Brezzi, Pietsch, Hug, Gollin, Barbieri, Platé, Bianco, Rami, Romano, Dipper and Lanza. Curiously enough, no ERA's were entered, perhaps due to the ultra high-speed nature of the course.

On Thursday, May 4th, practicing started. Spectators were treated to the unusual sight of Luigi Villoresi's fully-streamlined 4CL Maserati, making the debut of the single-supercharger sixteen-valve four-cylinder engine. This attractive car was very fast but proved unstable on the straights due to side winds. On this first day out it was obvious that the cars were miles-per-hour faster than the 1500's had been a year before, when Paul Pietsch's Maserati had gone round the circuit in 4:12.25 — timing was effected to the nearest 1/100th sec. Pietsch's 110 mph was upped by another 10. Two Alfas — Farina and Aldreghetti — went round in under 3:50, an incredible speed for such a small engine. Luigi Villoresi found himself consistently unable to drive the streamliner flat out and towards the end of practicing, Lang managed 3:45.73 against Caracciola's 3:52.74. Caracciola drove the car which both drivers had tested at Hockenheimring, while Lang's car had never before run at speed. Lang had to run his car in during practicing, and on the Thursday he was once again visited by that strange type of ill-luck which seemed restricted to Lang — stones breaking his goggles. Time after time this excellent driver would have to stop or slow down due to this circumstance, and yet such incidents are rare indeed in the motor-racing world. Perhaps drivers are right to be superstitious . . .

Lang and Caracciola had gotten into a typical argument about which was to be Number One driver for this race, and Neubauer was obliged to resort to a mixture of threats and cajolery to get them to see reason. The tactics were explained; Lang was to hurtle off and leave everybody else standing, but would stop to change wheels during the race, while Caracciola would drive at a more moderate pace and take over the race were Lang's engine to go. The drivers were worried about tires, as they knew how incredibly destructive this circuit could be, and they were surprised when they saw the new covers flown in by Continental, Mercedes' tire builders. Whereas it was usual for these high-speed (over 120 mph average) covers to be as thin as possible to minimize centrifugal force and consequent stripping of covers, the new ones were thick, almost clumsy-looking, and although the drivers started out with some misgivings, the tires stood the test.

On the Friday Villoresi found conditions more to his liking and lapped continually with the fast streamlined Maserati until he finally managed to beat Lang's time by few seconds; Villoresi averaged 131.6 mph (3:41.80). The Italians were jubilant, the Germans unworried; whether or not they had speed in hand, they knew that Villoresi's excellent lap had only been managed by forcing his car to the utmost, with a clear track and under ideal weather conditions. They felt that, barring unforseen eventualities, they had a pretty

good chance. Lang did 3:43.80 and on the final day of practicing, Saturday, he slightly improved on that time, although his 3:42.35 was just under Villoresi's lap.

Finally, the time for the start came round, after the usual interminable ceremonies connected with the drawing of the lottery. The temperature was stifling and, what was worse, a hot, salty wind, the Ghibli, blew in from the sea.

The wind worried everybody, but particularly Maseratis. They changed wheels on their streamliner and cautioned Villoresi not to try to go too fast. The start was to be given both by a system of lights and by the ceremonial flag; but a few moments before the pack was unleashed, Neubauer, Mercedes' racing manager, discovered that for official time-keeping purposes the lights counted, and not the flag. Neubauer was able to relay this information to Lang, but there was no time to tell Caracciola, as the lights were blinking off one after another, and as the last one went out Lang made a magnificent start, not spinning his wheels by as much as an inch, and was well way by the time the rest of the cars got their wheels moving.

Afterwards there was a fuss because many people said Lang had jumped the start. He hadn't. By the time the starter's flag had dropped, the Mercedes was definitely moving, but then Lang had been the only one to realize the significance of the lights. And besides, the race is under way as soon as the flag *starts to fall,* not when it has reached the lowest point of its arc.

As the cars streamed off a groan went up from the crowd. The sleek Maserati streamliner was in trouble already, and Luigi Villoresi was unable to get into third gear. Thus this promising car was forced to retire after covering only a mile or so!

On that first lap, Lang came by seven seconds ahead of Farina, followed by Caracciola and Cortese, while Maseratis obtained the unenviable distinction of blowing all their works' cars up on the first lap! However, a number of private Maseratis continued the fray, but the issue clearly lay between Mercedes-Benz and Alfa-Romeo, the dice heavily loaded in favour of the former.

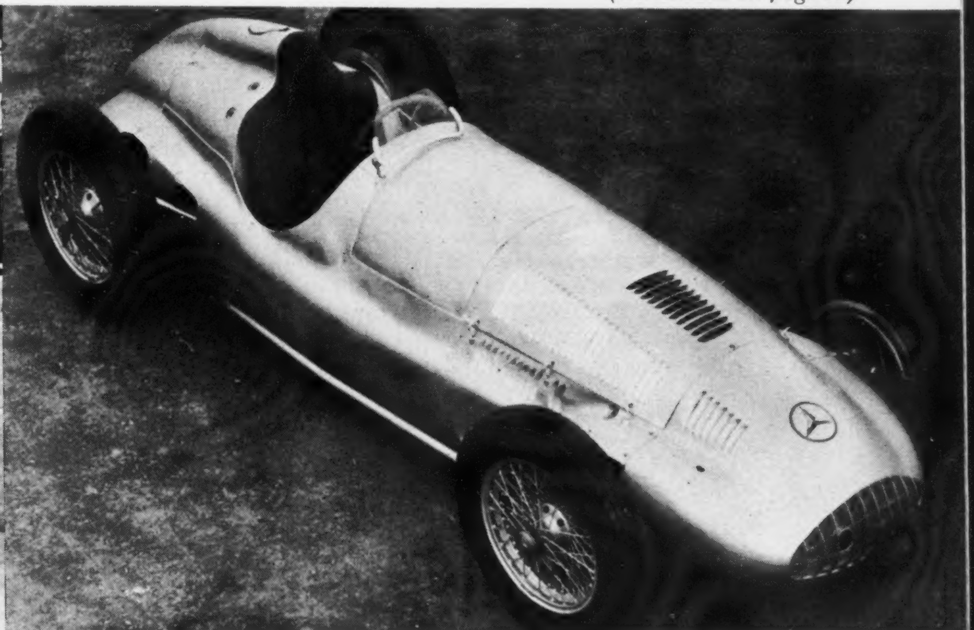
Driving very fast indeed, Lang soon found himself 'way out on the circuit, after covering the second lap in 2:45.67, or 129.8 mph. Farina kept his second place, but was losing 2-3 secs. per lap, and then Luigi Villoresi motored the streamliner out again to see if he could do something about breaking the lap record. Trossi retired with piston failure, and the intense heat began picking off one after another of the cars. But still the Mercedes whined on and on. Caracciola slipped into second place and shortly afterwards Farina quit out on the circuit. Now Mercedes ran 1-2. The Alfettes were in and out of the pits with plug troubles and dropped steadily back.

On lap 14, Lang came screeching into his pit, and in 40 seconds the fabulously efficient M-B pit crew swapped tires and refuelled the silver racer. The average was colossal: 127.6 mph, fractionally higher than the 1938 winning speed by a *three-liter Mercedes!* Shortly afterwards, Caracciola also came in for fuel but did not change covers.

By half-distance the race was a shambles. Lang was cruising round 'way out ahead, with Caracciola close behind and the first Italian, Pintacuda (Alfa-Romeo), a quarter of an hour behind! Emilio Villoresi ran fourth and Rocco fifth, while Severi's car had caught fire.

As the race wore on, Lang almost lapped Caracciola, but refrained from passing him although he could see the other Mercedes in the distance ahead of him. To have lapped his team-mate unnecessarily, would have signified incurring the wrath of Neubauer, which painful experience had taught the drivers to avoid if possible!

*(Continued on page 82)*

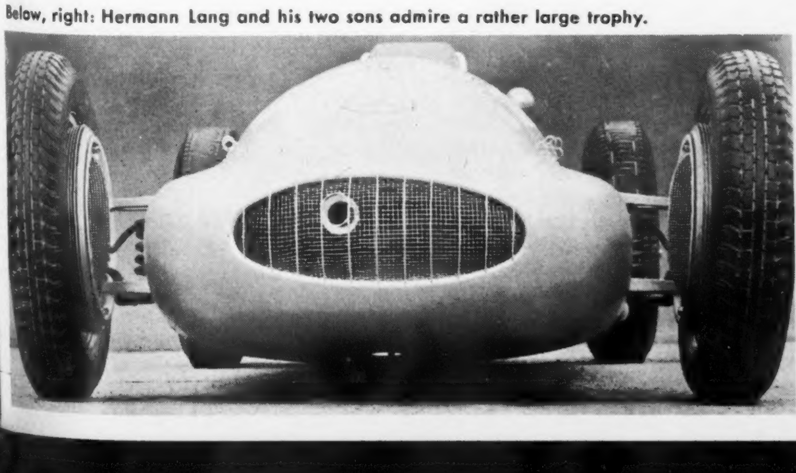


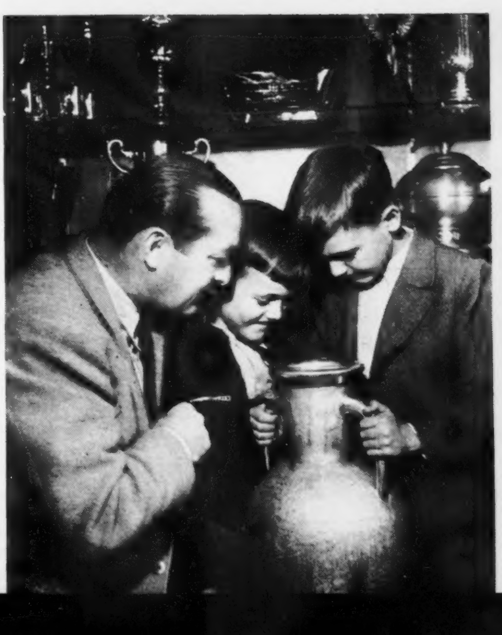
**Above: Hermann Lang, eventual winner, shown here in one of the fast bends that was characteristic of the Tripoli circuit.**

**Above, right: Although it was supercharged, the 1939 Type 165 had the same displacement and general proportions as the current Formula II cars.**

**Below: Behind the smooth nose and delicate grille was a DOHC V-8 with a two-stage roots blower. Horsepower output was 265 bhp at 7800 rpm.**

**Below, right: Hermann Lang and his two sons admire a rather large trophy.**



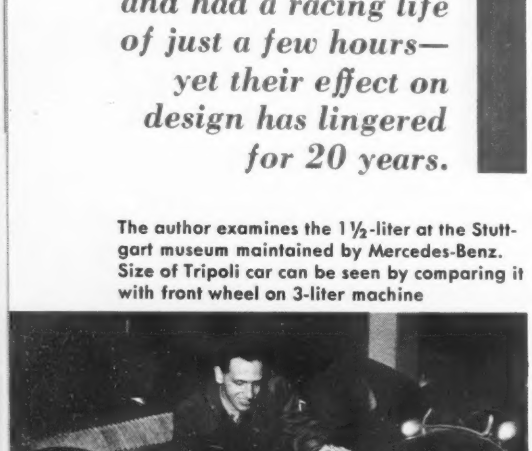


# BUILT TO WIN...JUST ONCE

*The one-and-a-half liter racing Mercs were built in eight months flat, and had a racing life of just a few hours— yet their effect on design has lingered for 20 years.*

*by Karl Ludvigsen*

**The author examines the 1½-liter at the Stuttgart museum maintained by Mercedes-Benz. Size of Tripoli car can be seen by comparing it with front wheel on 3-liter machine**



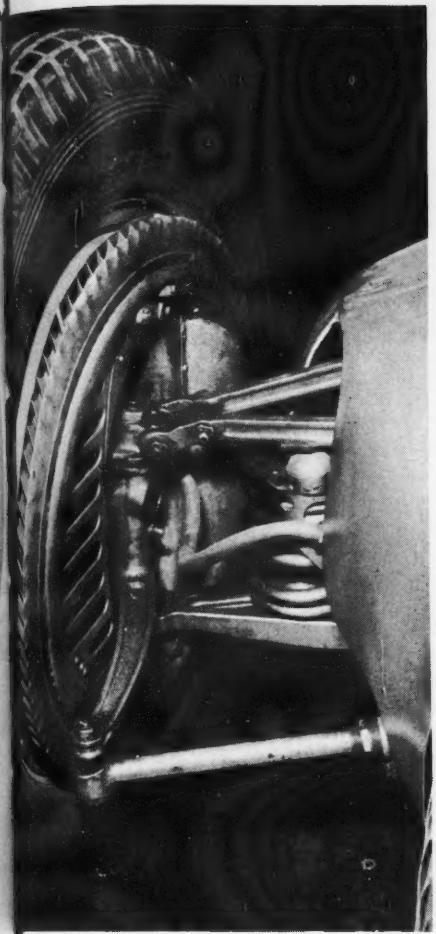
► Many legends grew out of the dramatic pre-war racing years, but none is more captivating than the tale of the two Mercedes designed and built to race and win just once. So dramatic were these times, indeed, and so overwhelming the statistics and performance factors of the Mercedes and Auto-Union cars, that many technical nuances of design and development have been completely overlooked. The even more spectacular 1½-liter V8's got even less technical attention — not that Neubauer was inviting reporters to peek under the hoods!

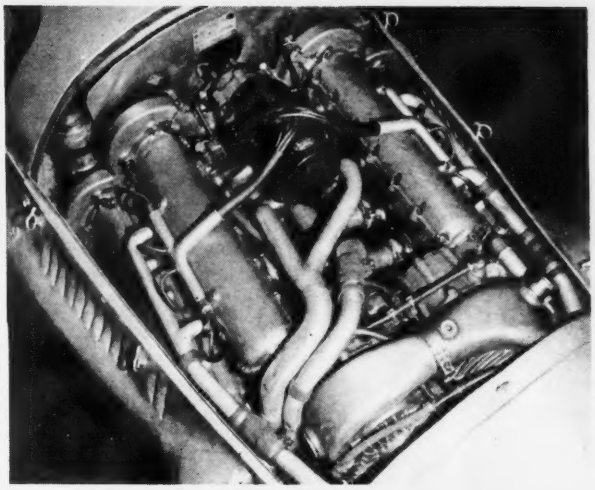
In mid-September of 1938 the world, Mercedes included, learned that the G.P. of Tripoli in the following May would not be run to the then-current Formula I but would obey the *voiturette* limitation of 1½-liters instead. Since 1933 this class had been contested by Maserati, ERA and Bugatti and most recently Alfa Romeo, so it seems likely that Director Wagner and his design team had a suitable car somewhere in the backs of their collective skulls, though probably very little was on paper. When the word was given the working drawings were turned out by the main Mercedes drawing office, the job keeping from eight to ten men busy almost four months. As soon as the drawings were off the boards they went out to the shops, enabling Uhlenhaut to have a prototype car assembled and on test over two months before Tripoli. Typically the drivers weren't called in until there was just a month to go, the final trials being carried out at the Hockenheimring because it most closely duplicated the high-speed nature of Tripoli.

Often called a small-scale copy of the 1939 W163 Mercedes, the W165 is more correctly an offspring of the 1938 W154, developed in parallel with the W163. It was then openly expected that post-'40 racing would be for 1½ liter cars, so it was not too early for Daimler-Benz to start gaining practical experience therewith. Not being obligated to race the cars after Tripoli, the Stuttgart technicians were free to rework them and experiment with them to their hearts' content. As evolved, then, the W165's became more advanced in many ways than the much-revered three-liter V-12's, and represent an important link between prewar and postwar technique. At the end of 1939 there were two complete cars plus three spare engines on hand.

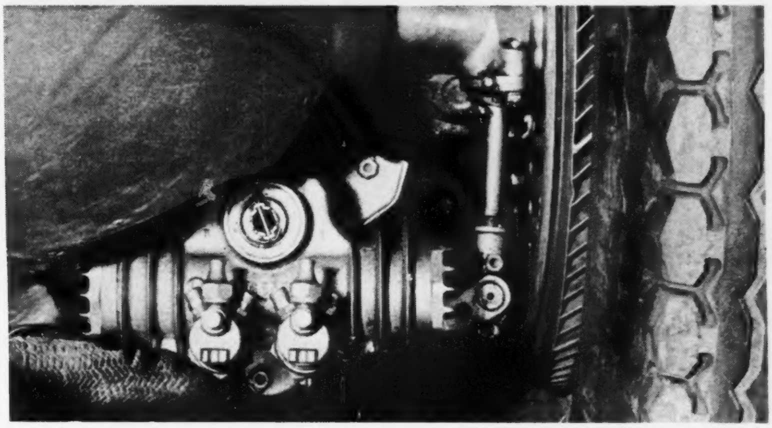
Most deeply rooted in the immediate Mercedes past was the chassis of the V8, patterned after the very successful 1937 W125 layout. Nickel-chrome-moly steel 1.75 mm thick is used for the frame side members, formed into oval tubing 2⅜-inches wide and 5⅛-inches deep. Spaced two feet apart, these tubes are cross-braced by five round tubes varying in diameter from 3½ to 2¾-inches, the resulting ladder being very little weaker in torsion than Mercedes' best postwar space frame.

Basic geometry of the unequal-length wishbone front suspension was unchanged, as was the forged C-section construction of the lower wishbone. A similar design used at the top on the bigger cars was abandoned here in favor of a much lighter arm made up of two I-section forgings bolted together. Apparently for the first time at Mercedes, the wheel spindles on





Front suspension (far left) used a much lighter upper wishbone made up of I-section forgings. V8 power plant (left) was one of the first oversquare racing engines. Short stroke made it easier to achieve revs needed to pull power from small displacement. Rear shock absorbers (below) were finned to dissipate the heat. To compensate for weight shift as fuel was used, shockers had a two position rate control operated from cockpit.



these cars were hollowed out for unsprung weight reduction. A throwback to principles tried on the 1928 SS Mercedes was the mounting of each suspension assembly on a vertical pivot so that the wheel can move *horizontally*, against rubber buffers, about half an inch. This was supposed to improve wheel controllability, but one of the trials on the W165 was the substitution of steel for rubber buffers without any notable change in the car's handling! Nevertheless the same lateral cushioning is still used on today's entire Mercedes 300 series. Encased in light alloy, a screw and nut steering gear was mounted from the left side of the frame where it could activate the three-piece track rod through a drag link and a bell crank extension from the left-hand radius arm of the track rod system. There are 2¼-turns from lock to lock.

The "Mini-Mercs" were fitted with the new pattern brake drum that had been developed for the W163, based on a nickel steel liner surrounded by a centrifugal cooling fan of light alloy. Two alternate drum faces were tried, one a simple drilled plate and the other a riveted double-walled face intended to centrifuge hot air from the drum interior. Twin leading shoes of light alloy applied Iurid linings to the drums, which were 12¾-inches in diameter and 2½-inches wide. Since 1938 dual master cylinders had been used on all Unterturkheim race cars.

Though much refined in detail the de Dion rear axle layout was basically the same as the 1937 reincarnation of the type, with trailing radius arm guidance for the hubs and an articulated center section to relieve torsion. Lateral location was again by a bronze block sliding between steel plates in a slot in the back of the gearbox casing. Copper-plated torsion bars 39¼-inches long are placed longitudinally and actuated by curved arms and links laid out to give a 30-percent increase in spring rate at full bump. An advanced feature of the W165 was the heavy finning of the rear shock absorbers — I believe for the first time in any racing car — which are further protected by asbestos jackets around the nearby exhaust pipes. To compensate for a weight shift as fuel is used up, the shocks have a two-position rate control under the driver's command. This ran counter to Uhlenhaut's desire to simplify the driver's job as much as possible, and has its counterpart in the spring rate control fitted to the W196 in 1955.

Hollowed half-shafts are carried between Hooke-type outer U-joints and inner de Dion "pot" joints which allow a sliding movement. Their housings are driven by the cam tracks of a ZF differential surrounded by a big spur gear, the whole of which sits atop the rear-mounted gearbox. Its shafts are transversely placed, like those of Grand Prix Ferraris, Maseratis and Aston-Martins today, to make best use of the available space. The differential is driven from the approximate center of the box's upper shaft, fifth and fourth gear sets being on the left and third, second and first — plus reverse — in that order on the right. Gear selection by dog clutches took place on the lower or input shaft, which received torque from a pair of bevels on the left, offset enough to that side to require an angled engine mounting and to allow a comfortably low driving position. Gearbox oil is circulated by a pump driven from the right-handed end of the input shaft.

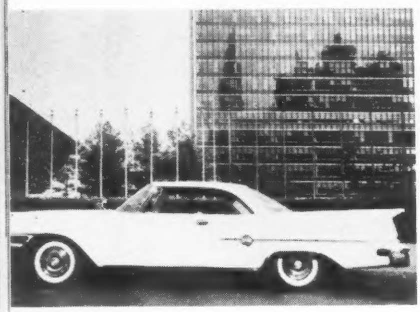
Traditional in layout, Mercedes' dry single-plate clutch (in unit with the engine) needed detail modification to enable it to cope with the much higher revs of the 1938-39 cars. The pressure plate was made from malleable rather than plain cast iron, and a sheet steel ring united the ends of the clutch spring cups against centrifugal force. Twelve coil springs exert a total pressure of 1480 pounds, there being (deliberately) no centrifugal assist from the withdrawal linkage.

Even at the time of its inception the W165's engine (specifically designated *M*165) was a much greater departure from the three-liter car than was the chassis. The most fundamental and meaningful change in direction was the bore/stroke combination of 64 x 58 mm. This strongly oversquare dimensioning contrasts with the 67 x 70 mm size of the three-liters, as well as with 82 x 94.5 and 94 x 102 — two of the bigger older straight-eights. The honor of being the first modern racing engine with "square" dimensions might go to the 78 x 78 mm sixteen-valve Maserati, which was publicly announced in January of 1939, but it made its track debut at precisely the same race as the oversquare Mercedes. Daimler-Benz had at least two good reasons for this worthwhile change of policy: 1) A short stroke made it easier to achieve the revs needed to extract power from this small unit; 2) If the mass of experience gained with the four-valve head layout were not to be tossed out the window,

*(Continued on page 74)*

# SCI ROAD TEST
# CHRYSLER 300-E

A is for alphabet, which is how you tell them apart.
It's also for action which you get in this cart.
B is for big which it is undeniably, while
C is for Chrysler who make it and sell it.
D is for devices which this car overflows with;
E is for this year, and other things too;
enormous, extravagant and energetic for sure.
F is for frantic as in Let's Get Hustling.
G is for for gas-guzzling and such a large grille. It's sure this car won't run on a pill.
H is for handling where this Chrysler is hot, though some still insist that it really is not.
I is for those inches, square, cubic and linear.
J is for Jaguar drivers, who avert their eyes. *You're faster? Lies, all lies!*
K is for King of the Road, because that's what you are.
L is for luxury motoring, a bit out of our line. It's also for loose door handles
which rattled and shook.
M is for mirrors, inside and out. One dips automatically, clickety-clack.
The other's adjustable without stretching your back.
N is for no ticket when you're on AutoPilot.
O is for outer space where you might want to fly it.
P is for power and push buttons, too.
Q is for quality; in details, it's lacking.
R is for rear end which is typically Chrysler,
changed from last year's, it's no hit, more a bunt.
Why can't it be different, just like the front?
S is for steering, ridiculously light. On smooth roads once used to it, it works out alright.
T is for transmission, Torqueflite by name. It's also for tires which suffer and scream.
U is for ultimate in fast moving luxury, though finances required involve you in usury.
V is for velocity, absolute maximum. It's figure is such we didn't dare, much.
W is for wits which we're now at our end of,
X, Y, and Z are the ones we can't think of.

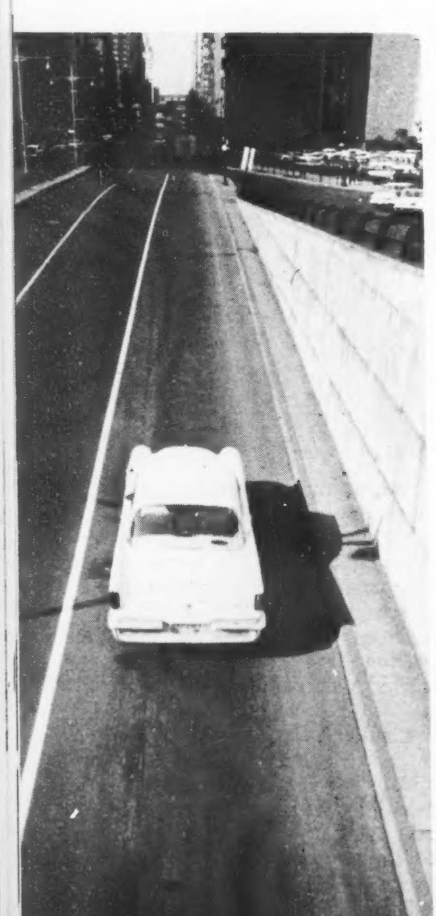


► As a matter of fact, an alphabet with only 26 letters is insufficient for a Chrysler 300E, so we will add further thoughts in no particular order—especially not alphabetical.

We complain bitterly that the steering is too light, so light that the ordinary jostling about you get in the cockpit overshadows the subtle clue available from the steering wheel rim. And yet this very lightness of operation, in this as well as other items is what makes the 300E so fascinating. Dimensionally, it is huge, yet an aggressive driver finds it has the agility of a 1500 cc sportscar. Truly, a Porsche Carrera with an overactive thyroid.

The question now in our minds is this: Would stiffening up the steering (less of the power assist or still lower gear ratios) give better feel without destroying the almost unbelievable lightness of control? We think it would. With power steering, the overall ratio is now 19.37; without, it's a sky-high 29.97 and 5.2 turns L to L.

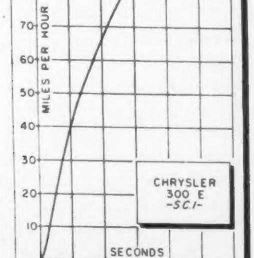
It's purely a subjective reaction on our part, but the idea of more than two tons of automobile to transport four people is somehow unacceptable. To others, it surely isn't, and the prospect of touring in a car of this performance is inviting indeed. Whether it's Gran Turismo or Gross Touring is a moot point.

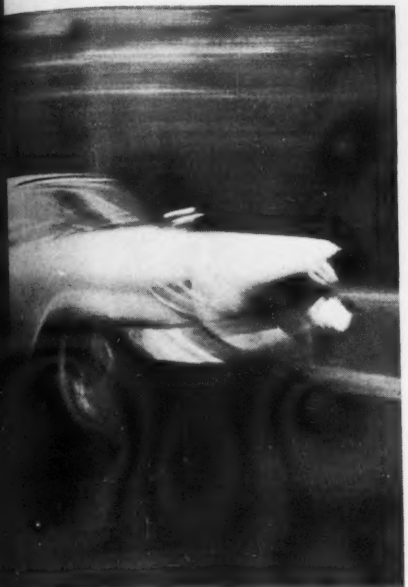


What is certainly grand is the way any 1957 or later Chrysler product will hustle around turns. Despite the super-light steering, complete and precise control is maintained up to a startlingly high cornering force. There is no sudden transition from under to over steer attitudes and the steering does not need violent corrections to hew to a selected course.

However, on irregular surfaces where oscillation of the road wheels make it more difficult to maintain a grip, the lightness of the steering so masks what is going on at the front wheels as to destroy the driver's confidence. It may be that the car CAN corner fantastically well on rough roads as well as smooth, but the driver is being robbed of information that is rightfully his and thus is unable to make appropriate corrective movements. This all applies to driving on the "ragged edge", where many onlookers would say we had no business trespassing in a two-ton plus machine.

Incidentally, early Chrysler advertising claimed for the torsion bar front suspension the credit for the vastly improved handling. Actually, the torsion bars are nothing but coil springs unwrapped, the geometry of the front suspension being more significant than that of the springs. But far more important than these changes (the upper wishbone slants downward at the rear to eliminate nose-dive on braking) are the rear suspension rearrangements. The latter are finally getting some mention though little credit in their current advertising. The leaf spring is not displaced symmetrically about the axle casing. Instead, about one-third of the total length is to the front and the rest is to the rear. The front bit is much stiffer than the rear and acts quite a lot like a radius rod, locating the heavy



rear axle better than usual, eliminating many undesirable rear-axle roll-steering effects.

The amusing thing about all this is that the rearrangement was not done in order to improve handling at all. The engineers were told to do something to shrink the floor hump required for the driveshaft. In moving things about to solve this sales problem, they stumbled upon a happy solution indeed.

If we were to be asked whether the 300E handled better than the Chevrolet tested last month, we would be hard put to find an answer. Neither car is intended for being driven "on the limit", that requirement is only for racing or sports-racing cars. If for no other reason, both cars are unsuited to continued ragged edgemanship because of the high rate of tire wear. One 300C owner wore out the front left tire in only two fast laps of the Bridgehampton circuit. Both these cars are set-up for fast touring, neither is set-up for racing. When pressed to the limit (presumably unintentionally, unless you have a credit card with a tire company), both maintain stability and controllability to the end which is all you can ask for. They aren't happy there—the scream of the tires remind you of that, but they're not ill at ease either.

Like the Chevy "Pursuit" car, the 300E enjoys slightly stiffer springs, though the one-inch shocks are unchanged. Rates at the wheel are 170 and 165 pounds per inch, front and rear, instead of 115 and 135.

Other technical items where the 300E differs from the New Yorker line of Chryslers include an 8% larger anti-roll bar and a half-inch larger driveshaft to handle the extra torque from the 431 cubic inch engine. The latter features a Silent-Flite fan cutout to save horsepower and gas at higher speeds, two four-barrel Carter carburetors and a hotter camshaft. Valve timing is 20-60 and 58-22 instead of 15-57 and 57-15. Duration is 260 degrees instead of 252 while overlap jumps to 42 from 30—still rather mild for the output obtained. Despite use of identical valves and springs, rated horsepower is 380 at 5000 rpm. Torque drops to 450 at 3600 from the milder engine's 470 at 2800 rpm.

Starting technique is simple: push the N-button, switch on and twist while holding 1/3 throttle. Correct idle is at about 650 rpm. When you start up from what has been a long rest you may hear a thumping sound which gradually dies away. This comes from the nylon tires which temporarily maintain the flat spot at their bottoms. It is very noticeable after a lunch-stop on a turnpike, since you pull out immediately onto smooth roads. It feels like something in the front suspension is terribly out of balance and it's certainly good ammunition for the Tyrex people. As to which tire is safer, ah well, who knows?

Among the many standard extras are the Sure-Grip limited-slip differential tucked inside the 3.31 to one final drive gears (2.93 optional). Another nice touch is that the 39.8 cubic foot trunk is upholstered with plush carpeting.

The big three may not yet have discovered the joys of a fully reclining seat,

## CHRYSLER 300E

**Suggested Advertised Retail Price at Detroit** .......... $5,318.50

### PERFORMANCE

**ACCELERATION:**

| From zero to | Seconds |
|---|---|
| 30 mph | 3.7 |
| 40 mph | 5.0 |
| 50 mph | 6.7 |
| 60 mph | 8.7 |
| 70 mph | 11.0 |
| 80 mph | 13.4 |
| 90 mph | 16.5 |
| Standing 1/4 mile | 17.2 |
| Speed at end of quarter | 92 mph |

**SPEED RANGES IN GEARS:**

Full throttle up-shifts take place at about 50 and 85 mph

**SPEEDOMETER CORRECTION:**

| Indicated Speed | Timed Speed |
|---|---|
| 30 | 30 |
| 40 | 40 |
| 50 | 49 |
| 60 | 59 |
| 70 | 68 |
| 80 | 77 |

**FUEL CONSUMPTION:** 11-14 mpg

### SPECIFICATIONS

**POWER UNIT:**

| | |
|---|---|
| Type | Water-cooled V-8 |
| Valve Operation | Pushrod in-line ohv |
| Bore & Stroke | 4.18 x 3.75 in. (106 x 95.2 mm) |
| Stroke/Bore Ratio | 0.90/1 |
| Displacement | 413 cu in (6770 cc) |
| Compression Ratio | 10.1/1 |
| Carburetion by | Two 4-choke |
| Max. Power | 380 bhp @ 5000 rpm |
| Max. Torque | 450 lbs-ft @ 3600 rpm |
| Idle Speed | 650 rpm |

**DRIVE TRAIN:**

Transmission ratios

| | |
|---|---|
| I | 2.45-5.39 |
| II | 1.45-3.19 |
| D | 1.00-2.20 |

Final drive ratio 3.31 (2.93 optional)
Axle torque taken by rear springs
Limited slip "Sure-Grip" differential fitted as standard

**CHASSIS:**

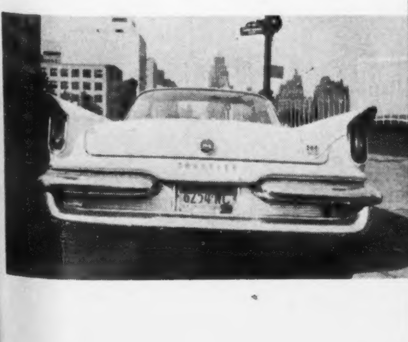
| | |
|---|---|
| Frame | Box section side rails with lateral cross-member |
| Wheelbase | 126 in |
| Tread, front and rear | 61, 60 in |
| Front Suspension | Independent, unequal wishbones, longitudinal torsion bars, anti-roll bar. Spring rate at wheels: 170 lbs/in |
| Rear Suspension | Rigid axle, unsymmetrical leaf springs. Spring rate at wheels: 165 lbs/in |
| Shock absorbers | One-inch tubular |
| Steering type | Rack and sector |
| Steering wheel turns L to L | 3.5 |
| Turning diameter, curb to curb | 47 ft |
| Brakes | 12 inch drums, vacuum-assist |
| Brake lining area | 251 sq in |
| Tire size | 9.00 x 14 |

**GENERAL**

| | |
|---|---|
| Length | 221 in |
| Width | 79½ in |
| Height | 55⅛ in |
| Curb weight | 4560 lbs |
| Weight, as tested | 4715 lbs |
| Weight distribution, F/R as tested | 53/47 |
| Fuel capacity | 23 U.S. Gallons |

**RATING FACTORS:**

| | |
|---|---|
| Specific Power Output | 0.92 bhp/ cu in |
| Power to Weight Ratio, as tested | 12.4 lbs/hp |
| Piston speed @ 60 mph | 1535 ft/min |
| Braking Area, as tested | 106.4 sq in/ton |
| Speed @ 1000 rpm in top gear | 24.4 mph |

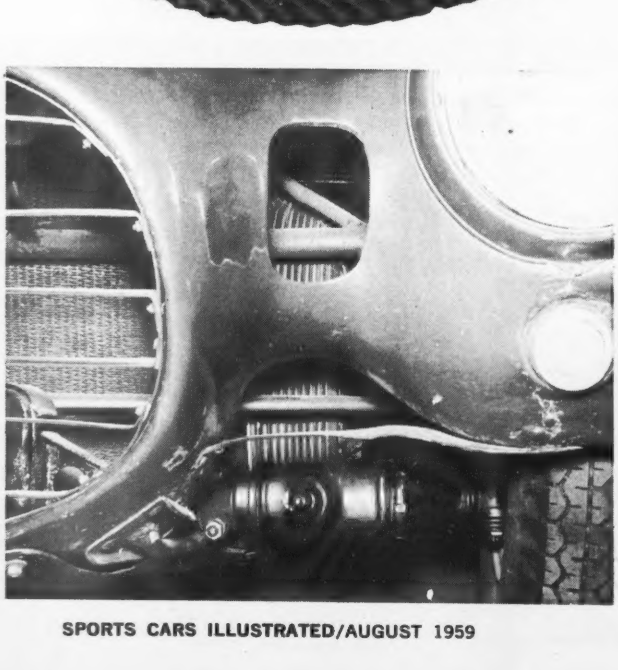


*(Continued on page 86)*

# RACING BRAKES

*by Karl Ludvigsen*

## *Part II: Drum Material, Structure and Cooling*



Stacked drums (above) are destined for 3500 GT Maserati. Helical fins across the braking surface, and ducts cast into drum face all assist cooling. Mass of metal also helps.

Sports/racing Lancias inboard front brakes forced body builders to do some fancy scissor work to insure a cooling breeze over the drums. Chassis mounted brakes helped to decrease unsprung weight, however.

▶ Measured against the value scale erected by Mercedes four years before, the basic brake mechanisms used by Ferrari in '58 were uncomplicated, well-balanced and developed over eight seasons of racing use in everything from Grand Prix to Gran Turismo. They weren't the best ever, but they were better than most. Yet, the braking of G.P. Ferraris during most of 1958 could only be described as "rotten". Astonishingly, in view of the great Ferrari backlog of know-how in braking systems, from Naples through Oporto the otherwise efficient Dinos were fitted with brake drums which could well serve as a copybook example of how not to do it. The Reasons Why can be broken down into three main categories: the material or materials of which the drum is made; the mechanical structure of the drum, and the cooling provisions that are included. With these parameters we can assay modern racing drum design.

Anyone will readily admit the importance of material in brake drum construction, but the great breadth of its contributions isn't always appreciated. For a starter, the drum mustn't wear too rapidly and must be matched with the character of the lining being used, to provide maximum friction with minimum erosion of the surface. Whatever its other virtues, the material must provide plenty of simple physical strength to resist the great stresses and subsequent strains often incurred in braking. All surfaces of the drum should conduct heat as rapidly as possible, and also be capable of retaining large quantities of heat until it can be dissipated. While holding this heat, moreover, its crystalline structure shouldn't break down. If it does, the linings will begin to tear the drum apart, just as a beginning.

Mainly because of its high mechanical strength and fine, wear-resistant braking surface, cast iron has become the classic stuff of which drums are made. It's heavy, a major drawback where brakes are mounted as unsprung weight, but it's superbly compatible with most kinds of brake linings. When the entire braking surface, from inside to outside, is made of cast iron, though, some knotty dilemmas often rear their horns — in racing installations, at least.

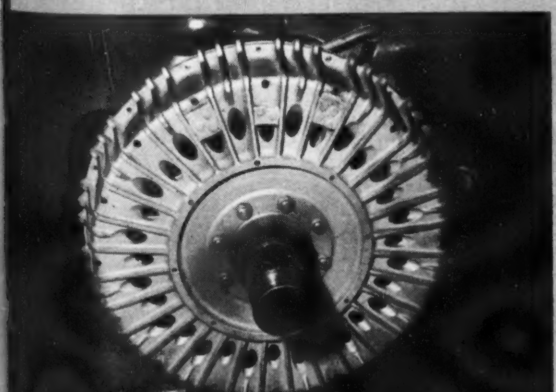
It is well-known that cast iron doesn't conduct heat nearly so rapidly as such stars as aluminum. In this respect alone it's high on the "undesirable" list, and in ability to retain heat — technically *specific heat* — cast iron rates about half as high as heat sponges like magnesium and aluminum. Several commentators — myself included — have erred in the past in describing cast iron as a material of high heat capacity in relation to aluminum. It is quite the opposite.

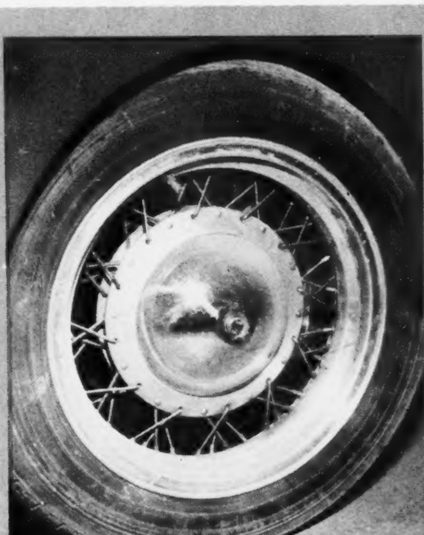
Faced with the low conductivity of cast iron, designers may try to make the drum braking surface as thin as possible, to give heat a short and reasonably easy path to the open air. If this is done, mechanical strength is likely to be sacrificed, with the result that the drum distorts from a circular shape and builds up some very high local temperatures which attack the brake linings, leading eventually to familiar fade. Finding this out, our designers turn to a much thicker drum section to supply the needed strength and perhaps add some heat capacity. Now they'll find that the very low conductivity of cast iron will allow a great difference in temperature to exist between the hot inner surface, in contact with the linings, and the cooler outer side. If, as frequently happens, very hard use of the binders brings the inner temperature level as high as 800 degrees C., the structure of cast iron begins to change. Cooled or "quenched" by the outer masses, the inner surface can change from a pearlitic to a martensitic structure, a transformation which is usually accompanied by an actual change in volume of the iron concerned. When part of the drum gets bigger while the rest doesn't, something has to give. Cracks will start to form around the boundaries of the metallic grains and as extensions of the graphite flakes that exist in solution in the iron, and the drum is on its way to self-destruction. There are compromises between the thick and thin extremes, of course, but compromises in racing car design are seldom satisfactory.

Not in the least daunted by these walloping objections, the designers of the V16 BRM flew in the face of the evidence of racing during the preceding twenty years to revive the cast iron brake drum, which, together with the Girling three-shoe mechanism already described, was supposed to provide "optimum stability of braking throughout long-distance events". It's hard to evaluate this "pioneering" installation for several reasons: 1) While it used these brakes the BRM didn't finish many races; 2) The Girling innards would have made the drums look good; 3) The BRM's flexible front suspension would have made the drums look bad. At least it can be said that the brakes *didn't* require Ferodo's *hardest* linings.

More worthy of discussion are the cast iron drums used on the D50 Lancias during most of their racing life. They were used extensively during prototype testing during 1954 and finally fitted to the cars for the Argentine races of January, 1955. Jano and his men chose the extreme of the very thin drum, giving it the necessary strength through careful design of the fine finning. Its heat capacity must have been very low indeed, but convection cooling was encouraged by setting the front drums well out in the air stream on this open-wheeled G.P. car.

Ferrari carried on the new cast iron tradition in his 1½ and 2½ liter Dinos of 1957, which used virtual small-scale tracings of the Lancia drums. While the braking surface was iron, it was copper-riveted to a face of lighter and heat-



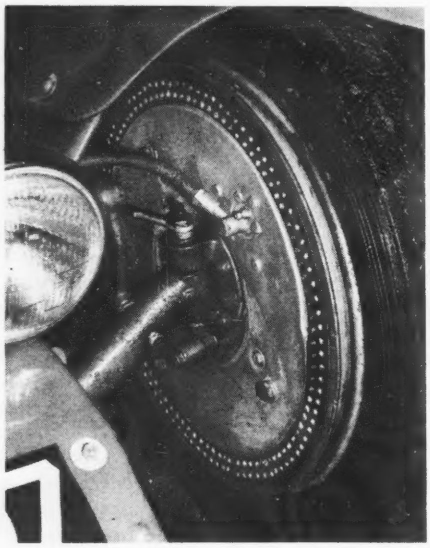


Maserati drum for 1957 did away with rib shroud although fittings for covers were retained. Drillings to drum interior and balance weights are visible on this front wheel drum.

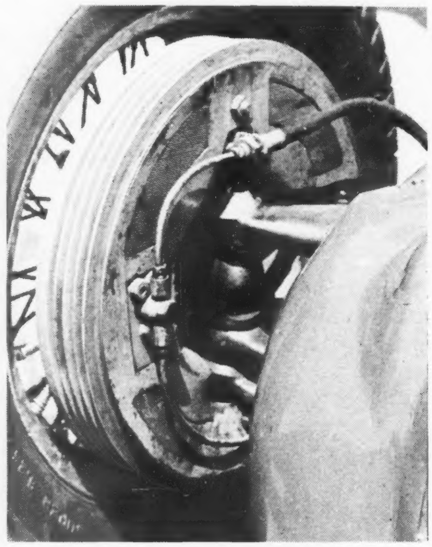
A Nardi sports two-seater (near left) demonstrates just how little in the way of equipment is needed to stop a light car. Motorcycle-style brake featured a unique intergration of wheel with brake drum.

Ferrari Dinos had bimetal drums for '58 Italian GP. Performance was better than cast iron forerunners.

Sebring Ferraris in 1957 used this heavy bimetal drum. Similar setup was used later at Le Mans and on '58's.

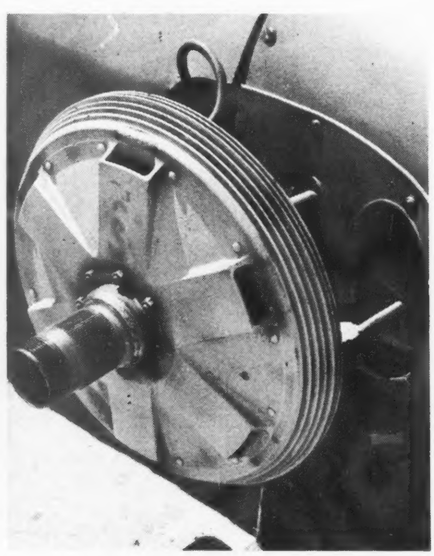


Early Brooklands Riley used this big, but narrow drum. Cooling, on light slow car, was not too important.



English 2LS brake adapted to 4CL Maserati had simple circumferential finning and screened vents in plate.

Air intake scoop was used on Type 158 Alfa backing plate. Ferrous liner is flanged for fitting to drum.



Classic Ferrari brake drum design has six radial air vents. Holes near vents allow lining dust to escape.

happier magnesium alloy. First on a sports car and then at Naples in 1958 appeared the now-familiar helically-finned Ferrari drum, which featured a rather thicker braking surface cross-section. This slight change, it seems, got them involved with the temperature gradients and structure changes described above, with the result that hard, molded linings were needed to withstand the heat and abuse of the breaking-up brake drums. After just a few hot practice laps at the Nürburgring the inside of the drum was always seen to be deeply discolored around areas of local heating. The mechanics would do their best to level these off with crocus cloth, but they were only postponing the inevitable.

Seeking an escape from these wildly gyrating vicious circles, as long ago as 1922 the creators of a Grand Prix car (Fiat) endowed it with *bimetal* brake drums. The objective was, and is, to unite the ideal ferrous braking surface with a light-metal body which can carry and conduct heat better. It's an ideal combintion, since the iron or steel insert can be made quite thin, the aluminum face and finned "muff" being relied upon to supply the needed strength and to fling off heat as fast as possible. There's a catch, though. There must by definition be some kind of boundary between the iron and aluminum, and it's always difficult to coax heat to cross such boundaries without the assistance of metallic bridges.

Often used during the Thirties and since the war, one of the simplest ways of joining liner to drum is to cool the former and heat the latter and place 'em together, having first machined both so there'll be an interference fit when they come to the same temperature. Such liners are usually said to be "shrunk" in place, and don't afford particularly good heat transference from liner to drum. Yet since 1953 this system has received a lot of use from Maserati, who secure the liner against rotation with some 16 rivets around the open mouth of the drum.

Others have chosen the practicable method adopted by Ferrari when he returned to the bimetal fold at the end of 1958. He simply turns a very rough, broken-threaded finish on the outer surface of his iron liner, then places this in a mold and casts the rest of the drum around it. A good mechanical bond is formed by the interlocking boundary that results.

During the last war there was a lot of interest in creating a genuine molecular bond between ferrous metals and aluminum, for such applications as air-cooled airplane engine cylinders, and parallel research toward this end was carried out by Fairchild Aircraft in the U.S. and Wellworthy Ltd. in England. A licence for the resulting processes was granted by Fairchild to Wellworthy and several Continental firms, under the trade name of the *Al-Fin Process*. For over ten years Wellworthy have given special attention to the brake drum problem, finding most suitable for the treatment a cast iron liner with a very low phosphorous content and a small but well-defined distribution of graphite flakes. Al-Fin drums have become near-standard wear for modern drum-braked sports and racing cars, particularly those built in England, since they provide much

better heat flow from liner to drum than either of the alternatives described above.

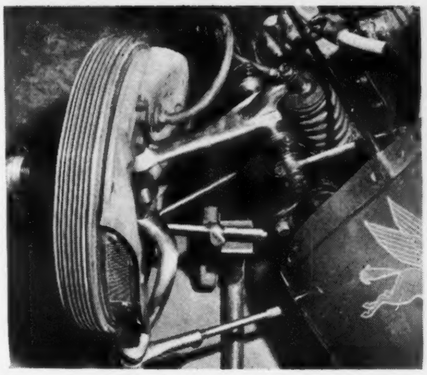
For the W196 and S196 racing cars, Mercedes-Benz naturally chose Al-Fin drums, about which their Director of Racing Car Construction, Dipl.-Ing. Ludwig Kraus, had some very pertinent remarks to make, as follows:

"During long, hard braking the heat input into the liner is very great. At the same time the bond, with respect to heat flow, to the light metal body isn't metallic over the entire surface (around 70 or 80 percent at best), with the result that the cast iron liner is heated *much* more severely than the light metal body. In spite of having almost half the expansion coefficient of the body, in extreme cases the liner ring can expand to become "larger" than the body, and thus, against the resistance of the strong light metal drum, can be subjected to a *shrinking* action. When the brake cools, then, the ring will begin to separate from the drum body, cracks being likely to appear in the liner at the same time. Thus begins the destruction of the drum and brake lining; the brake becomes useless. To avoid this a very close experimental agreement between the temperature relations of the two metals is necessary. With smaller dimensions an improvement in bonding is manifestly possible. Our smaller outboard drum proved more resistant (to this cracking) than our heavier inboard unit. The type and quality of the lining, as well as the attainment of as even a lining pressure as possible, plays an important role."

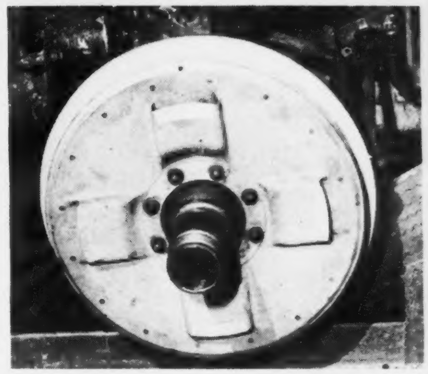
Naturally these Mercedes Al-Fins were worked about as hard as any racing drum brake ever has been, and these problems cannot be taken as criticisms of the Al-Fin process. 70 to 80 percent metallic bonding is 70 to 80 percent better than any other alternative can offer. On certain 300SLR sports cars, notably those for LeMans, Mercedes installed pushbutton-controlled oil jets to each brake drum, possibly to lubricate the braking surface and allow the cars to continue when signs of this drum deterioration appeared. Some SLR's also carried, inboard, the better-bonded outboard-type lightweight drum!

Daimler-Benz also assembled some concrete data on the valves of specific heat and weight in the control of brake drum temperatures. As an example Dipl.-Ing. Kraus took (figuratively) a Formula I Mercedes, with fuel tanks half full, up to 190 mph and brought it to a complete stop. This produces 1030 BTU's of heat. Taking extreme — yet often possible — conditions, this stop can be made in 9 seconds with a deceleration of 0.92 g, or even in 6.8 seconds if 1.09 g is applied. Since very little heat can be dissipated in so short a time, it's possible to neglect that aspect and calculate the rise in drum temperature that will be incurred by this large heat input. This was done for two types of drums: The outboard drum, weighing 15.1 pounds, and the 20.8 pound inboard drum. Assuming an initial temperature of 80 degrees C., a thermometer on the inboard drum would rise to 230 after the stop, while the mercury on the lighter outboard drum would skyrocket to 275 degrees C. Engineer Kraus points out that these figures correspond closely

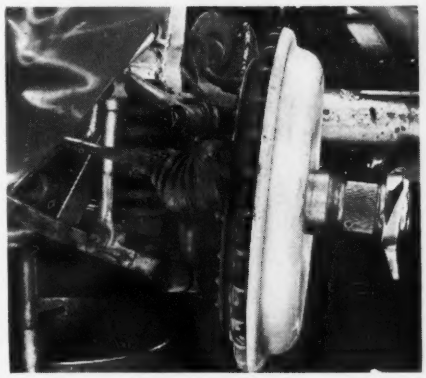
*(Continued on page 75)*



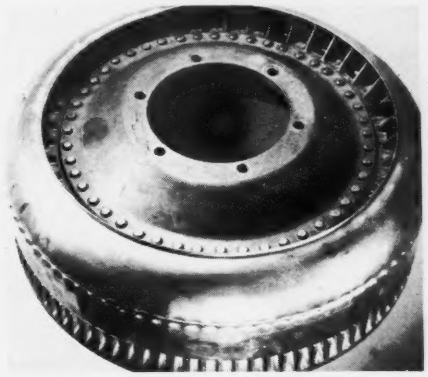
Air entry and exit scoops on 4 CLT/48 Maserati were highly developed being cast right into backing plate.



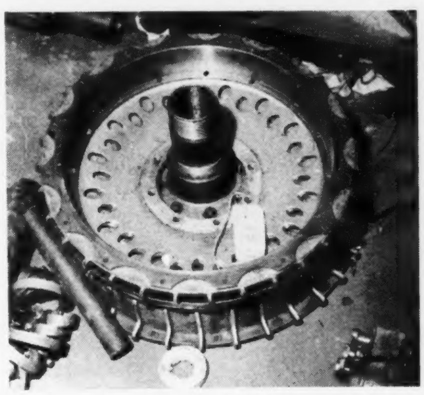
Very early Ferrari brake drum had centrifugal face venting plus shallow fins to help dissipate hot air.



Colombo designed brake drums used centrifugal cooling for 300S Maserati sports racing car.



Inboard drum used on W 196 Mercedes GP car carried plenty of aluminum to help increase heat capacity.

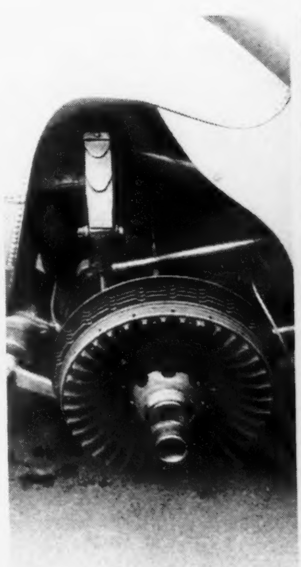


Maserati drum (left) is shrunk in place and further anchored by rivets through scalloped stiffening flange. Holes through inner flange are for lining dust.

Rear brake drum of Dino Ferrari (below left) is almost identical to D50 Lancia brakes. On those cars face ribs were covered by annular covering plate.

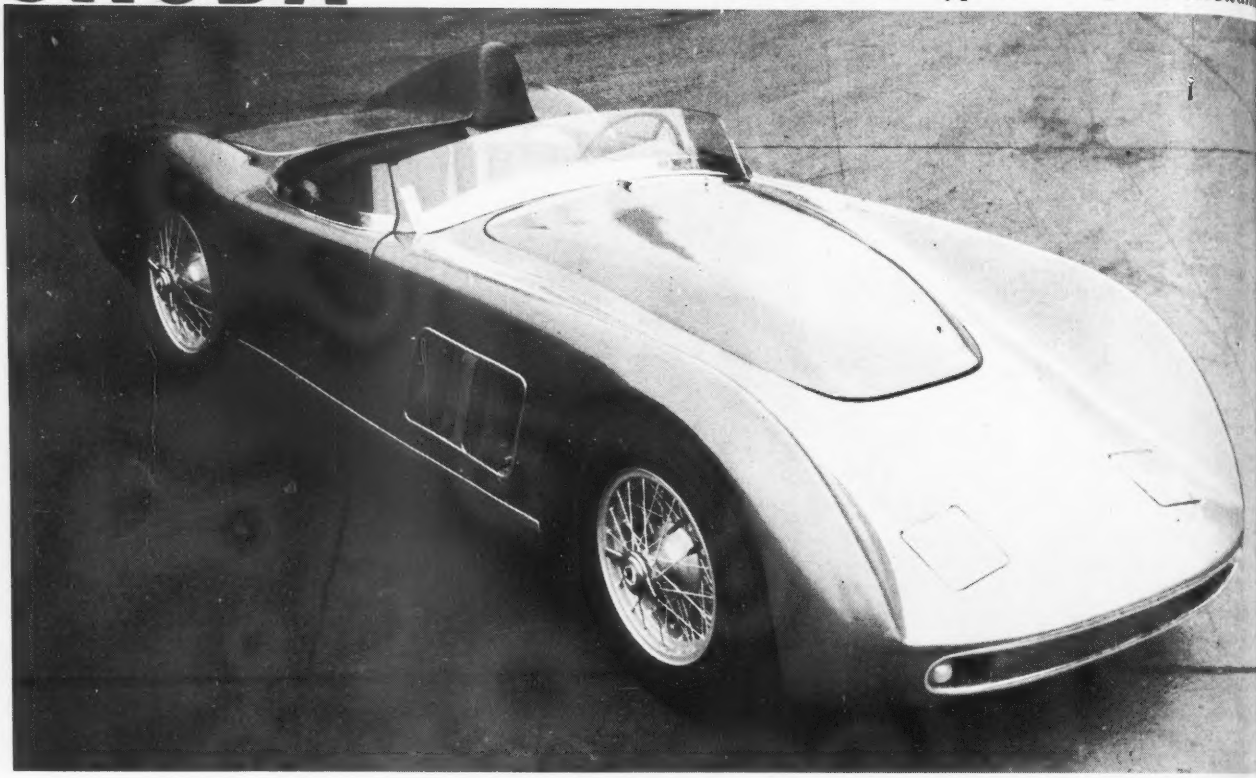
1958 Dinos used this front drum (below middle) with magnesium face riveted to cast iron braking surface. Lack of stiffening rib at drum mouth is noteworthy.

Mercedes W154 was equipped with typical screened vent arrangement found on racing cars in the middle '30's. Drum was finely finned, deepest ones near edge.



# SKODA SPORTS

*by Donald G. Typond and Jesse Alexand*



► It has been almost ten years since SKODA last built a racing sports car. This was in 1949 and the occasion was the International Automobile Grand Prix of Czechoslovakia, marking the beginning of post war motor racing in that country.

The first SKODA racing car was basically the production sedan of the time, with an open sports body of aluminum and a few engine modifications. These were limited at first to an increase in compression ratio, followed by the fitting of a supercharger and a redesign of the combustion chambers and valve layout.

These cars, although somewhat successful in their initial stages, could not keep up with the specially made cars being built by competing countries. Added to this was the fact that various local enthusiasts were also building faster specials. It was therefore decided to abandon the principle of using only production parts in favor of building something entirely new in order to remain in the running.

The new car that was developed and built retains only the 1100 cc displacement and basic engine block of the production car. As for the rest, it has been designed for one purpose only . . . racing.

The engine has a bore and stroke of 68 and 75 mm respectively, which is the same as that of the production engine and therefore represents a saving in tooling costs. The factory admits that a redesign of the engine, giving a more favorable bore/stroke ratio would be ideal, but high manufacturing costs and the need for extended development time become prohibitive.

An aluminum alloy cylinder head with hemispherical combustion chambers and dual overhead cams is used. The valves are arranged with an included angle of 90° with the intake on the left and exhaust on the right. The camshafts are spur gear driven from the crankshaft, which, though heavier than a chain drive allows independent timing and adjustment of each cam.

The camshafts drive, at their rear ends, two magnetos (or distributors if battery ignition is used) which supply spark to the four pairs of spark plugs. Both mags are coupled to insure proper synchronization of ignition advance for both plugs of each cylinder.

Two twin-choke horizontal carbs are used, and are of Czechoslovakian manufacture known as Jikov type PAL. Amal carbs were tried initially, but the Czech units are preferred. These are mounted to the head with flexible pipes to eliminate variation in fuel supply due to engine vibration.

In the spot where the original camshaft was housed in the block, a short shaft now drives the double oil pump and tachometer, the drive of the latter passing through the original location of the distributor. The top oil pump provides lubrication to the crankshaft and camshaft bearings and all the most highly stressed parts, while the lower pump supplies lubrication to the remaining parts, especially gears and valve rockers.

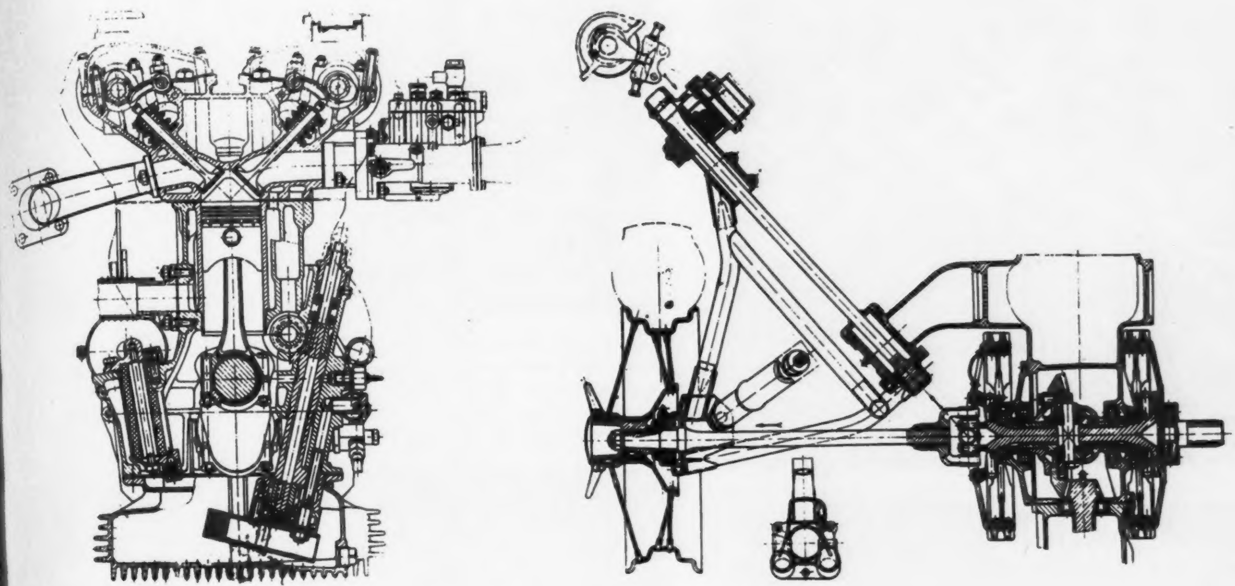
Cooling of the oil is accomplished by hanging the deeply finned sump out through the bottom of the belly pan. No oil radiator is used, but cooling is further assisted by the fins on the oil filter housing.

The water pump is mounted low on the right side of the engine, and is a separate unit not integral with the block. V belts from the crank nose drive both the water pump and the generator.

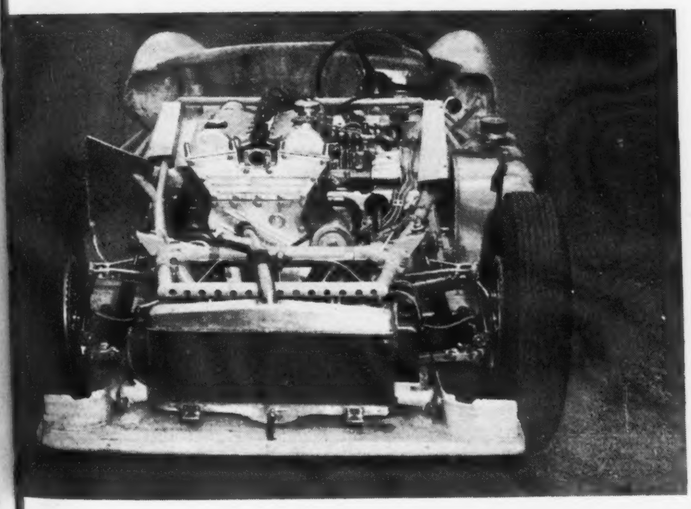
The pistons are of aluminum with high domes to fit the hemispherical combustion chambers. The resulting compression ratio is 9.25 to 1, as high as possible for use with the comparatively low octane Czech gasoline. Trial tests have been run using gas with an octane rating of 87.

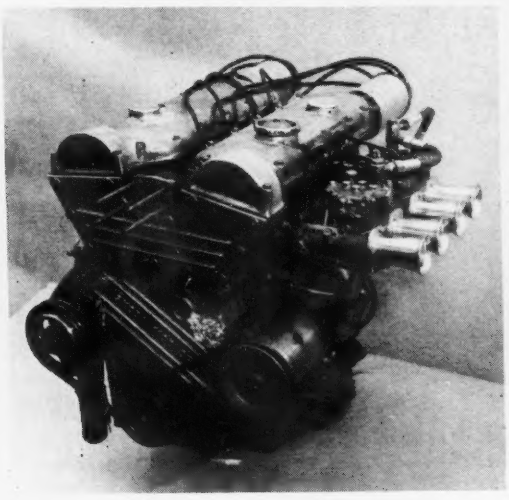
Connecting rods of chrome-nickel alloy attach to the three bearing crank on journals that are 5 mm larger in diameter than on the production version. All faces of the crank are polished, and the journals are case-hardened. Bearings are of lead-tin alloy.

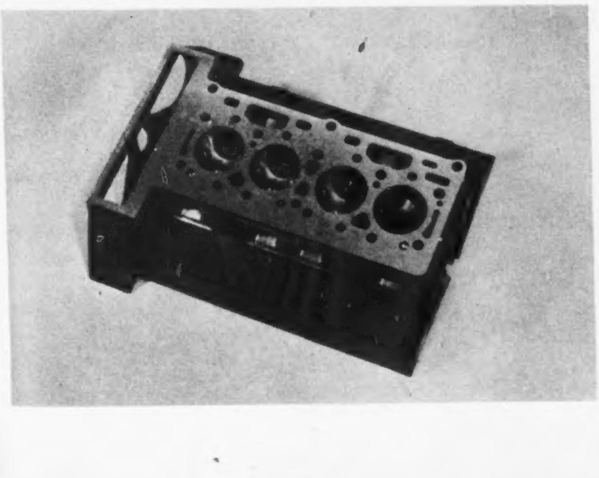
The engine, in its present stage of development, produces 92 bhp at 7500 rpm, and maximum torque of 63.5 lbs-ft at



Sectional view of the 1100 cc DOHC Skoda engine. The other drawing is of the left side of the rear end. Torsion bar angles diagonally forward in line with the universal joint just outboard of the brake drums.



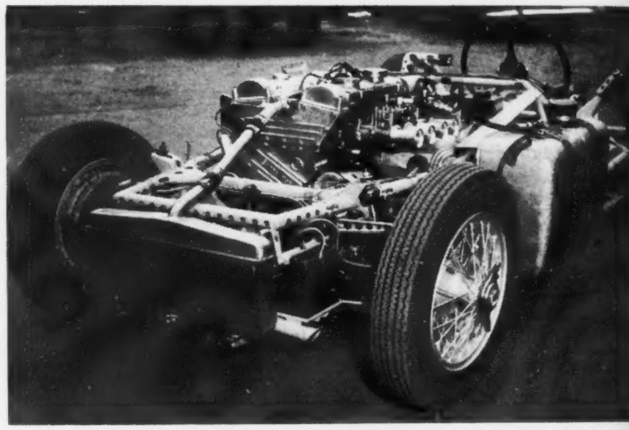


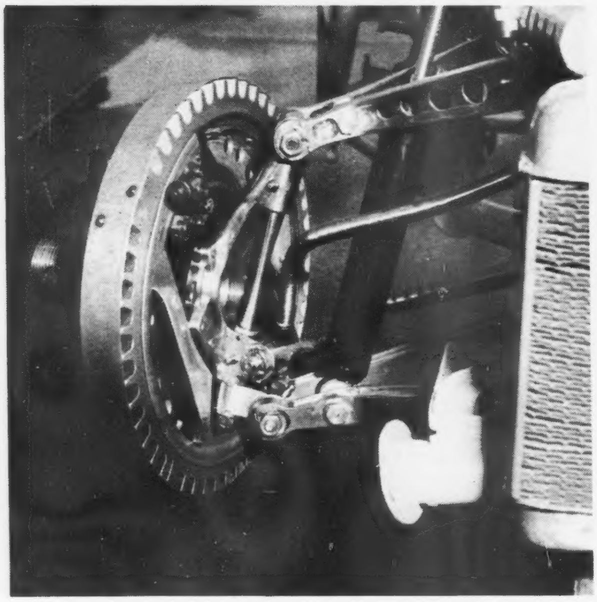


Above left: Front view of the exposed chassis shows offset engine. Header tank for low radiator is not shown.
Above: Engine carries two dual-throat Czechoslovakian carburetors. Maze of wires leads to eight spark plugs, two per cylinder. Water pump and generator flank engine in front.
Left: Pent-roof combustion chambers contain two large valves and two spark plug holes each. Exhaust ports are square.

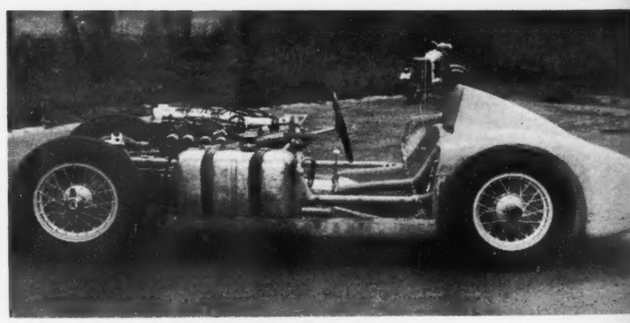
Engine sits high in space frame chassis. Gas tank is slung on left side.

Above: Gear box extends to the rear of the differential. Aluminum brake drums are finned and scooped to aid cooling. Forward end of torsion bar is visible just ahead of the right rear wheel.
Below: Battery, when used in place of magneto ignition, is mounted to the left rear of the radiator.

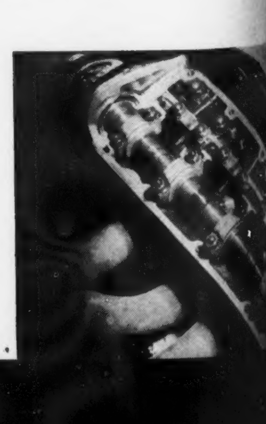




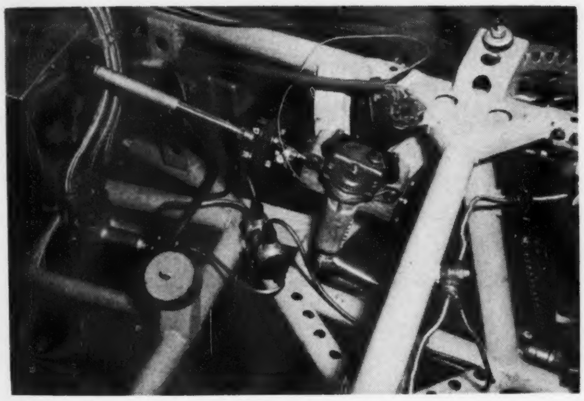
Above: Front suspension parts are all highly polished and extensively drilled. 11-inch diameter brake drums are a bit narrow looking.
Below: Front of upper wishbone is splined to torsion bar while the rear pivots around it. Double acting shock mounts to lower wishbone.



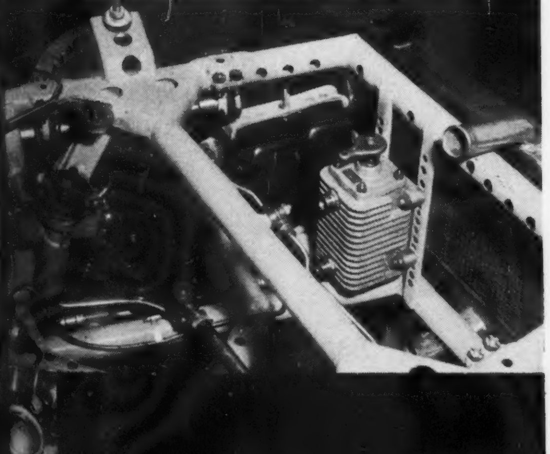
Above: Full belly pan is made of fiberglass, as is the rest of the body. The body serves only to streamline the chassis and is not stressed, nor are any working parts attached to it.
Below: Each camshaft is supported by five bearings and is gear-driven.

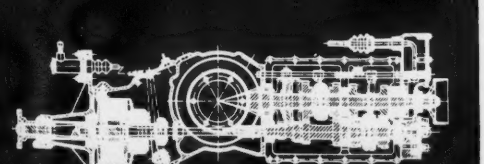


**Above:** Rear view of body shows orthodox shape, large bulge over engine.
**Below:** Space frame comes together in a point at the rear with brackets to hold rear-end components.



**Above:** Worm and nut steering box utilizes rubber universal joint to steering wheel.
**Below:** Small finned box is the oil filter. There is no oil radiator used, cooling is helped by fins on sump





**Left:** Section drawing of five-speed gearbox, differential, and multiple plate clutch.

5500 rpm. According to factory sources, "Engine running is reliable, and its output permanent, so that there are all reasons to believe that further development will arrive at values of the world level."

The frame of the car is constructed of small diameter thin wall tubing that is drilled for further lightness. The frame provides all the rigidity, the body lends no stiffness to the structure but only serves to streamline and carries no mechanical parts. The seats, pedals, etc., are mounted directly to the chassis, thus eliminating any need for special body reinforcement that would add weight. Body design meets with all international racing regulations governing dimensions and details and includes a full belly-pan, which smoothes out the complete underbody except for the sump. Material used is fiberglass reinforced plastic.

The engine sits upright in the frame, but is offset to the right of center to allow a lower driver position. The centerline of the engine is parallel to the centerline of the car, but unlike Indianapolis car practice wherein the driveshaft runs straight back to an offset differential, the shaft on the SKODA angles back to the clutch-gearbox-differential group at the center of the rear end.

The clutch is mounted in unit with the rear end, and is of the multi-plate wet variety. This type of clutch was chosen because of its advantage of having a smaller diameter than a single plate clutch of the same torque capacity, and since it is mounted low in the rear, ground clearance is at a premium. Clutch actuation is hydraulic.

Power is transferred by the clutch to the five-speed gearbox, which is mounted aft of the axle. The case is split along its longitudinal axis and a web supports the center bearings on each shaft. Due to the length of the five speed shafts, this additional bearing location was deemed necessary. To eliminate axial stress of the bearings, all gears are straight cut ... louder, but less expensive to produce. The top four gears are synchronized.

Gear box lubrication is provided for by an oil pump that forces oil through jets to lubricate each gear and the differential gears.

The tail end of the upper gear shaft is equipped with a drum for the hand brake which uses an external contracting band. The nose of the shaft drives the rear axles via a standard differential. To lessen unsprung weight, the brake drums are mounted on either side of the differential case. The drums are of aluminum alloy with cast iron liners and are deeply finned and fitted with scoops on their outer faces.

The axle halves are located by tubular steel trailing A-arms which have their axis of pivot on a diagonal to the centerline of the car. The rear leg of the frame is splined to the end of a torsion bar that is supported by an extension of the differential case. The forward end of the torsion bar is secured to the chassis and the forward leg of the A-frame pivots around the bar. The bracket that secures the splined end of the torsion bar to the chassis is easily removed to allow adjustment of the bar.

Front suspension utilizes unequal length wishbones with the top ones attached to longitudinal torsion bars. Bronze bushes are used at all pivots to insure perfect alignment. To reduce unsprung weight, the wishbones are drilled and the pivot pins are hollow. No anti-roll bar is used as it was found unnecessary during factory tests. Double-acting tubular shocks are used on all four wheels.

Brakes are hydraulic, with a dual circuit system employed to insure braking on one circuit should the other fail. The drums are approximately eleven-inches in diameter and are finned and vented on all four units. Each brake is set up with two trailing shoes in order to prevent unwanted servo action, and each shoe has its own operating cylinder. Thus,

*(Continued on page 87)*


ʼelow: Headlights are recessed ɪeatly in sculptured nose but not aired. Well-designed functional ʼent sends cooling air to engine.

# SCI ROAD TEST RENAULT CARAVELLE

► This test began much as any other. The voice on the other end of the line asked:

"Would you care to road test our new Caravelle — you know, the Floride?"

"Sure," we said. "When and where?"

The voice was off-hand as it sprung the shocker.

"Brittany," it said. "Can you leave on the 29th? That'll give you a day in Paris since you'll be picking up the car there on the First at Regie Renault. Sorry you won't have more time in Paris but we're following a pretty strict schedule," the voice continued, somewhat apologetically.

There it was, just like that. For months we'd had European Editor Jesse Alexander badgering the Renault people for information on plans and future production without result. Not a word — well maybe one word: "later."

Now came the deluge. Four days of rushing for passport, searching for that smallpox vaccination certificate left over from a Cuban trip, digging up other papers and dictating last minute letters followed and then I was shaking hands with Alexander in the airport at Orly. Like I said, just like that.

A few minutes later and we were plunged into Paris traffic in a Renault Domaine station wagon. The taciturn driver, ever-present cigarette hanging from a lower lip, obviously was doing his best to take a scenic route and at the same time show how a true Parisian chauffeur can hustle through his traffic-jammed city.

We and two other American editors together with our European staffers were quartered at the Royal Monceau. Here we got the official briefing on what was to come. Also a somewhat unofficial briefing. As we were arriving the British contingent was leaving. Seated in the lobby was the technical editor of one of the most famous British weekly motoring magazines, looking, to put it charitably, a bit peaked. To be blunt about it he was a pale shade of green.

"Trouble?" asked Jesse. "How did it go?"

"Great," said our British type. "The cars are delightful, the scenery scenic and the hospitality almost indecent. The only trouble is they *feed* you."

Prophetic. The official briefing was explicit. The Englishman's was descriptive. Both were true.

Nightlife was out. Sure, it was Paris but there were reasons. First, it was raining; second we were to arise at 6:30 in the morning to pick up the cars. Finally we were to drive these cars from Paris to St. Brieuc in Brittany by lunchtime, something like four hours worth of driving. Mind you this is not eastern U.S. touring but done continental style which means

that the hand throttle is pulled out and bent down or the foot firmly planted on the throttle and bolted to the firewall except for small towns along the way. Any other speed changes are done with the gearbox.

The Renault people were as good as their word. At 6:30 we were routed out, fed breakfast and taken to the Renault garage. There they were, five Caravelles — Florides actually since the word was embossed on the side — but Caravelles officially.

All but one were equipped with the new four-speed gearboxes that will surely be the most popular of three options. The exception was equipped with a standard clutch and the familiar three-speed transmission that is normal equipment on the Dauphine. The third option, not in the sampling, is to be the three-speed gearbox with the Ferlec automatic clutch.

Outwardly all five cars looked alike but there was a difference other than the gearboxes noted above. Three of the cars were actually convertibles and two were coupes. Yet unless one looked very closely indeed all five seemed to be coupes, so closely did the hard-tops fit. Each top is fitted with the same quarter-windows and the same back-light and exactly the same trim as is the solid topped coupe. Close inspection, and only close inspection, reveals the small clamps that hold the top in place and the well in which reposes the folded convertible top. This last item drops completely out of sight and out of mind leaving a large space behind the front seats that is actually a luggage shelf but which could on occasion be used as a seat, especially if one bothered to install a flat, foam-rubber cushion. We used it for luggage since the relatively capacious front luggage compartment was equipped for purposes of the trip with spare gasoline (French fuel prices: one dollar a gallon!), ,tools and camera gear. In normal use this space will easily swallow a good-sized suitcase and numerous bits of soft luggage such as coats and sweaters.

With the cars loaded we set out on schedule. We were guided through Paris by the omnipresent Domaine wagon and then turned loose on the outskirts of the city with a route card, a map and instructions to show up at the Cafe Loran near St. Brieuc.

"Go!" said the man. ". . . and have fun."

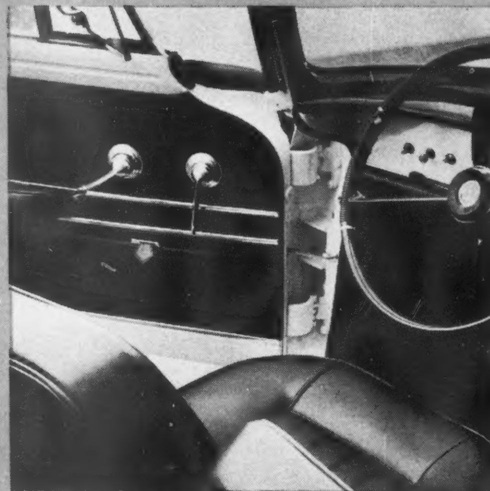
What had been a rapid but orderly procession through the city now became a private Mille Miglia on a Renault-size scale. Most of us were tempted at first to pootle along U.S. style at least until we got the hang of things but the European editor of one of the other publications was on his native heath and promptly buried his foot in the gasworks.

"Hey, he can't do that," Jesse howled. "Get with it, Dad!"

The honor of the home team at stake, we did just that. We soon found that while the French roads are relatively narrow, they are beautifully marked with warning signs and painted lines. Speed limits are posted only in villages or really dangerous areas. There aren't many regulations but those that are posted are rigidly enforced. Police are death on crossing a solid yellow line for instance. Another thing that is important is that the slow driver does not begrudge the fast driver his speed and in return the fast driver takes

Caravelle engine looks like familiar Dauphine unit but holds 40 horses instead of Dauphine's 31. Power raise was gained through larger intake passages, valves and carburetor. Right: cornering at 60 mph "on rails".

Doors open wide, access and ease of entry are excellent. A touch of luxury is the removable transistor radio unit.



Door hinges are solid and meaty, with a very firm hold-open feature. Pockets hold an immense amount of gear.

The car was at home both on narrow streets in ancient villages and fast *Routes National*

With hard-top in place the Caravelle convertible is virtually indistinguishable from the coupe. Six clamps hold it in place.

it upon himself, and very seriously, to watch out for the slower traffic. This is not terribly hard since there are few blind turns except in built up areas, even in the hedge-row country. You might not see a go-kart around the bend but cyclists, pedestrians and Citroen 2 CV's can be spotted if you watch what you're doing.

Obeying these few precepts proved easy and we stormed after the Frenchman with all stops out. The Caravelle stood up to it nobly. The gearing is admirably spaced for this sort of driving although the linkage, at least on these early versions, could stand revision. Finding the various gates proved a problem and on one occasion proved dangerous. Going for second gear on one turn, we frantically hauled back on the gear lever and no amount of stick-waggling would locate the slot, leaving us gearless as we went through the turn. It speaks volumes for the handling of the Caravelle that it held the line all the way through without an ounce of power at the rear wheels, albeit with a howl of outraged protest from the tires that had those that were following listening for an ensuing grunch that never came.

The Caravelle engine has been given just a shade more power than the almost exactly similar unit in La Dauphine but this wasn't too apparent due to the somewhat lesser punch provided by French gasoline compared to American fuel. Nonetheless, thanks to the four-speed box, power delivered to the road was adequate to handle any situation up to the capabilities of the car. The Caravelle is a basic understeerer, in fact it will plow into a corner unless tweaked to provoke a sort of false oversteer when driven hard as we were doing. Normally, however the feeling is one of neutrality and a very comfortable one it is. This is one of those cars that even when pushed moderately fast can be *driven* through a turn. Steering is neither too quick nor, for touring purposes, too slow at 4½ turns from lock to lock and is dead accurate with no feeling of slop.

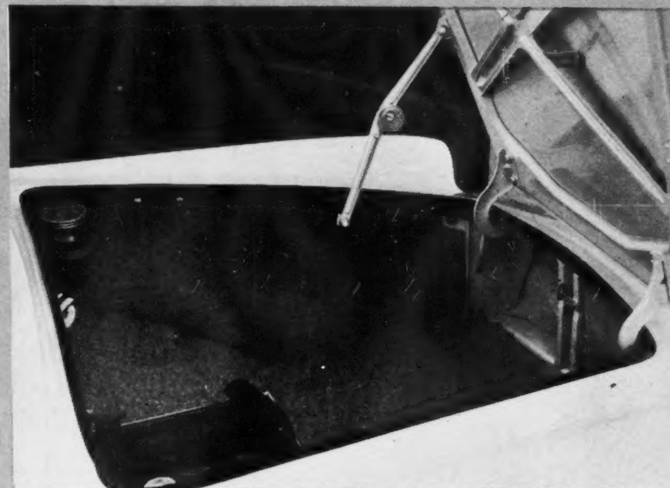
All five of the cars were almost equal in performance but still had enough tiny differences to make things interesting, particularly in this part of the trip. The aforementioned heavy-footed Frenchman had a car that was a shade quicker from an acceleration standpoint than the others. Maybe the fact that it was painted screaming red had something to do with it. Ours, a powder blue job, seemed to have a few more revs on tap than the others, particularly in top gear. Another seemed to get off the mark a little sooner while the one with the three-speed box was a bit more maneuverable at those speeds where second gear was just right and the four-speeders were faced with a sort of Hobson's choice between using second or third.

Despite this near equality, we were all out of sight of each other after about two hours of driving time. The lead man had taken advantage of his knowledge of France to tear off on a by-pass not mentioned in the route card while we churned through a town. The two Americans in the car behind us made the mistake of crossing a solid yellow line behind us after we had made a tire howling turn. The two Gendarmes hidden around the bend were alerted by our approach and while they debated a course of action, the others popped around the bend with two wheels over the line. Up went a white-gloved hand and — well the rest is pretty universal in any country. As for us we'd been through it before and there was no need to hang around. We blew.

A short while later we came to a cluster of houses and a cross-road. There sat a white Caravelle. As we drew up a man climbed out and held up his hand. We stopped and he came over to the car. In a mixture of French and English he informed us we'd arrived. The Cafe Loran was just down the road. Lunch time.

Lunch. Sure. Some two and a half hours later we got up from the table. Slowly.


Tail treatment of the Caravelle is smooth and without ostentation. Grillework is not mere decoration but is used to exhaust engine air.



Front compartment, unlike that in many rear-engined cars, is spacious enough for real luggage. In test car it held tools, spare gas, cameras.

Use of convertible top completely changes the appearance of the car. It folds completely out of sight when not in use.

A blow-by-blow description of that "lunch" is not germaine to this story but suffice it to say that this little mid-day repast brought back the English friend's all but forgotten unofficial briefing. It left us wondering just what was to be tested—the Caravelle's ability to take nearly 900 miles of barreling or our ability to withstand and absorb enough Breton cooking to have carried Napoleon's *Grande Armee* to Moscow and back. Not to mention enough wine and Calvados to float the ark.

This mighty feed was presided over by genial Robert Sicot of Renault. After we had staggered to our feet, M. Sicot informed us we had some more driving to do and jumped into the white coupe we'd seen before. Followed then a mad rush into and out of the ancient port town of St. Brieuc and on to a tiny hamlet perched high on the rocky coast called Le Rosellier. Here, behind a small comfortable *manoir* Regie Renault had set up a complete garage and service depot. The cars were taken away by a swarm of engineers.

"Dinner will be at eight," said M. Sicot. "In the meantime help yourselves to the facilities. Play with the new Estafette, climb down to the beach or just loaf. The bar is inside."

I needed the location of the bar like I needed a large round hole in my head. Some of the others opted for a nap. The rest of us decided to try out the Estafette, a new front-wheel-drive van based on Dauphine engine and drive components and with about eight million urban uses depending on bodywork. Despite the 15-foot roadways lined with rock walls in and around Le Rosellier the rather bulky vehicle was agile and quick.

The less said about dinner the better. Not that it was in any way, shape or form less than excellent. It's just that it was an extension of the lunch and the volumetric capacity of the editorial frame can take just so much.

The next day we were routed out at the crack of dawn and given route cards and maps of Brittany with — naturally — a rendevous point for, you guessed it, lunch. The maps were of such scale and so detailed there was no danger of getting lost so everybody just scattered. No spectacular hurry this time so we tried the Caravelle on virtually every sort of road Brittany has to offer which is a wide variety indeed. While most of the Breton roads, even the secondaries, are smooth if narrow by American standards, there are some that are jarringly rough. The Caravelle showed a few minor rattles on the really rough roads and on the cobbles that form the village streets but other than that it behaved impeccably. There was no tendency to skitter or to jounce badly. It could be barrelled when we felt like it or we could poke along and feel comfortable in either instance. This is not a car that has to be kept revving. It will lug down in top gear to less than 20 mph and pull smoothly away. Or you can drop it into second gear and charge up to 50 mph before having to go into third. Top speed with a very short run was 137 kph indicated which figures out to about 83 mph. This is a bit deceptive, however, due to the optimism of the speedometer. The actual timed speed showed a true velocity of 72 mph. On other occasions, particularly that first day, with a good long run we had gotten an indicated 150 kph which means it was claiming 92 mph. Dropping that by 11 mph, the optimism factor, still figures out to 82 miles an hour. In any case the chances are good that on a calm day in wide open country and enough space to get up a good head of steam the Caravelle can be expected to hit an honest eighty, a respectable figure for 850 cc's worth of engine in a car as roomy as this one. Acceleration is not spectacular but quite brisk at 27.1 seconds to a true 60 mph. Quite possibly the coupe or the convertible with the hardtop left at home would be quicker. Our version with hardtop on and the convertible top folded weighs 1,719.6 lbs. The others weigh 1,644.6 and 1,675.5 lbs., respectively for the

*(Continued on page 94)*

# americans at LE MANS

# will we ever win?

*by Hugh McGrillen*

1951 saw the Cunningham Stable back at Le Mans for a second try at victory. Lead car here is the C3 model still large, and heavy by Continental standards, but design-wise a step in the right direction.

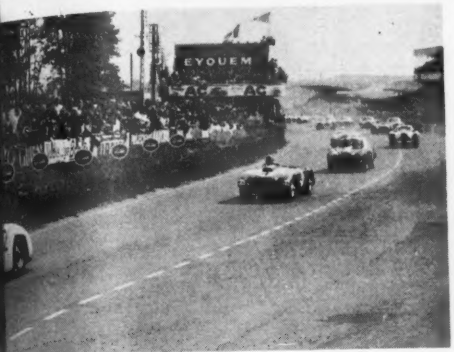
► Was it Al Smith who said "they never remember the guys who come second"? Whoever it was, might have had the Le Mans 24 Hour race as a reference. Winners of the Grand Prix d'Endurance are in a special page of honour of the game's history. The double winners; Birkin in a Bentley in '29 and Alfa Romeo in '31; Raymond Sommer in an Alfa in '32-'33; Jean-Pierre Wimille in a Bugatti in '37 and '39; Bueb in a Jag in '55 and '57 and Flockhart in a Jag in '56 and '57. Only two drivers gained a triple victory; Woolf Barnato in a Bentley in '28, '29 and '30 and Luigi Chinetti in an Alfa in '32 and '34 and then 15 years later in the sensational 2-liter Ferrari (the smallest capacity ever to win the event); in 1949 when he drove for 22 of the 24 hours.

The winning marques, too, are among the games immortals. Bentleys (5), Jaguars (5), Alfa-Romeos (4—in a row, '31, '32, '33, '34). Ferraris (3) and Bugattis (2). Some of them have retired to plutocratic dowager status like the Bentleys. Others, sadly have ended their run like the matchless Bugattis, and the earlier French winners the Chenard-Walcker and the Lorraines. Only the finest products that the automotive industry makes have been able to put an average month's motoring into a day, and a night, and at the same time, beat off a lot of serious-minded opposition.

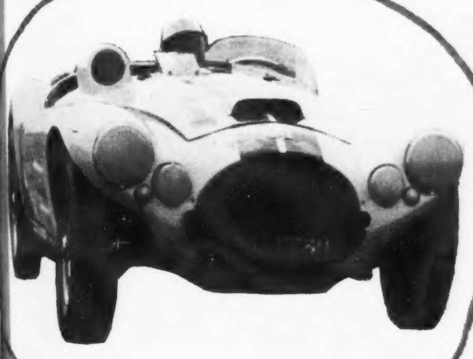
Apart from the winning glory, the big moments from Le Mans have been the heroic efforts that just failed; the almost super human feats of courage that didn't show up in the records. For instance, Masson, in 1957, who pushed his French-entered Lotus more than half way round the course, when he ran out of gas on the Mulsanne straight; about 4½ miles in an hour and a half. Or Pierre Levegh's unforgettable solo-drive in 1952 when the big Talbot seized-up in the 23rd hour with the opposition nowhere in sight and the race in the bag. Leygonie in 1954 who drove the fabulous little Osca in 8th place among the giants only to be disqualified in the 23rd hour for getting "outside assistance" to restart after it stalled.

But the greatest "might-have-been" story in the Le Mans epic was a continuous struggle that went on from 1950 to 1955, and seemed once or twice to be nearly in sight of the magical checquers. That was the Cunningham epic. No other part in the race's history has had the same magnetic appel or the same crusading spirit. For five years Briggs Cunningham and the small circle of sportsmen he gathered, notably Phil Walters, John Fitch and Bill Spears, took on the role of the American attack on European supremacy at Le Mans. The history of that campaign is now in the folk-lore of American – and European – motoring. It is possible that there may still be some hermits who have not heard the story. There are? Good; because I'm going to tell it anyway.

In 1950 Cunningham and Phil Walters decided to have a peek at the opposition and entered two heavily breathed-on Cadillacs. One was a sedan, the other a special-bodied open car. The open model had an all-enveloping body that was easier on the air-flow than it was on the eye. The French strightaway dubbed it "The Monster". In general the European




A Cunningham C5R leads the pack shortly after the start of the 1953 French classic. This car was demolished at Rheims after the 24-hour race. Driver John Fitch narrowly escaped with his life.



Above: First Cunningham car was dubbed Le Monster by the French. It was a brave attempt to duplicate European sports-racing cars using American components.

Left: C4 car was a far cry from the slab-sided "tank" car that ran in 1950. It was the equal of Continental competition.

Right: Mr. and Mrs. Briggs Cunningham show the flag at Le Mans.

reaction to this American voyage of re-discovery was one of bemused toleration. Briggs and Phil Walters drove the open car into 11th place and the Collier Brothers finished one spot higher with the Sedan. So much for an experiment.

In '51, came the first of the Cunninghams. For the previous winter, Walters and Cunningham had got in quite a bit of homework on the Le Mans lesson. The result was the appearance of three Cunninghams; the C's 1, 2 and 3. European interests — and by interests I mean the big, professional manufacturers with critically heavy investments in sports-racing machinery — had a quick double-take. In the first year the French had been frankly skeptical, and the Italians had dismissed the American entry with a characteristic shrug. The British were patronising. But you could say definitely that the European attitude of benign toleration ended, as of June, 1951. The Cunningham's were professional jobs. Chrysler V8 power-units of 5.426 c.c.s. that had departed significantly from standard specifications sat in fully-braced space-frames, and the wind-cheating body was smooth and professional. However the promise was not held; Walters and Fitch finished 18th and the other two were 'abandon'.

The third year retrieved the promise. The Cunningham equipe returned with three C.4.R's; a coupe and two open models, with all-independent suspension, and even more advanced bodies. That was 1952 — the Mercedes year. The Unterturkhein contingent, generalled by Neubauer, systematically pulverised all the opposition — including Levegh's Talbot — to finish 1, 2, 3. All, that is, except Briggs Cunningham, who was next home, having driven all but a couple of the 24 hours himself, to find 4th place in what must have been one of the toughest battles of tactics and team-work in the history of the Grand Prix d'Endurance.

Then came the first of the very "near misses". In 1953 with considerably modified C5R's, the amateurs went motoring professionally. The power plant was still the old reliable Chrysler. Radical changes were made in suspension, including solid-bar front end with regards to Le Mans surfacing. The American challenge that year was formidable. Walters and Fitch were 3rd, Briggs Cunningham and Bill Spear were 6th and Moran and Bennett were 10th all in Cunninghams. Of two Nash Healeys entered one driven by Johnson and Hadley was 11th.

The following year was the second "near-miss". Two Cunninghams contested the issue in 1954, and the third car was a V12, Cunningham-Ferrari Model with liquid-cooled brakes. Brakes take a ferocious pounding at Le Mans, and probably are the most significant single component, as witness the success of the disc types and the extraordinary air-brakes of the Mercedes 300 SLR. The two Cunninghams still retained the Chrysler V8 now with four twin-choke Solex carburetors and putting out about 310 b.h.p. The cars were now very highly developed machinery. The brakes had Bendix Servo boosters, which meant the possibility of rapid lining-wear. To guard against over-wear a red warning light was fitted on the instrument panel, designed to light up when lining-wear reached a certain stage, leaving a big safety margin to finish the race. Sherwood Johnston and Bill Spear finished 3rd and Briggs Cunningham and Bennett were 5th. How near can you get? To win would have been a minor miracle, for Froilan Gonzales driving in an inspired frenzy in the big 4.9 Ferrari won at a speed of 105 mph almost the same as the previous year's all time record. All this in cyclones of wind and rain, with the road like a shallow river, and the cars invisible in spray.

It is probably more than coincidence that the Cunningham stable stuck by the Chrysler engines, for they have a long Le Mans tradition. A Chrysler was the first ever American car to race at Le Mans back in 1925. It was one of the 3.3. Chrysler Sixes, but was not classified as a finisher. In 1928 they appeared again in the hands of European drivers and four 4-liter models started. Two retired in the early stages, but the other two finished 3rd and 4th at 65.1 and 63.2 mph.

The next year had a big American entry, though still with European drivers. Three Stutz 5.2-liter Hawks, one Du Pont, and two more of the 4-liter Chryslers started. The du Pont checked out on lap 20 but one of the Stutz' was 5th at 65.5 mph and the two Chryslers were 6th and 7th close astern. The two marques made three further bids in 1930 — '31 and '32, without success. In 1933 a 7-liter Duesenberg caused a sensation by its size and power and by motoring very rapidly for fifty odd laps and then getting itself disqualified for taking on gas before the permitted time.

*(Continued on page 83)*

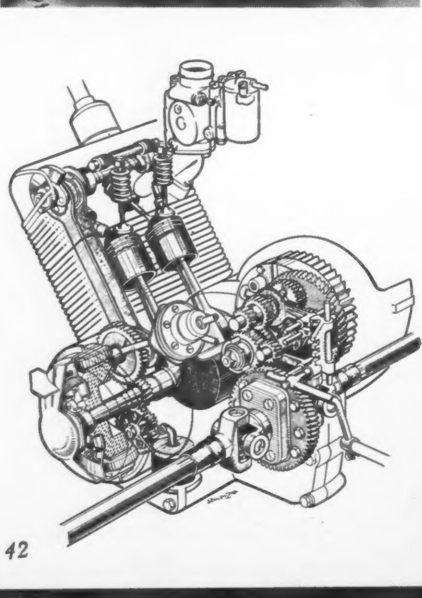
# SCI ROAD TEST
# NSU PRINZ

It's difficult to tell just how big the NSU is without a driver inside. Visibility through huge glass area is great. Side windows crank back and forth instead of sliding into door; do not take up inside room.

Luggage is stowed in the nose aft of the vertically-mounted spare tire. Paint work, both inside and out, is superb. Complete body is dipped in paint rather than more normal spray finish. Chrome is also good.

Knee-level picture makes the Prinz look more racey than it really is. Bumper plus guard is effective against people who don't stop backing until they hear a tinkle.

Swivle vent pane is actually in rear quarter light. Novel position helps promote draft-free ventilation for complete passenger space. Rear glass area is more than adequate for-press-on-regardless-style driving.



Price at East Coast POE.................$1398
Price at West Coast POE.................$1495
U.S. Importer: ......Fadex Commercial Corp. 487 Park Ave., New York 22, N.Y.

**PERFORMANCE**

**TOP SPEED:**

Two-way average ....................63 mph

**ACCELERATION:**

| From zero to | seconds |
|---|---|
| 20 mph | 4.7 |
| 30 mph | 8.0 |
| 40 mph | 12.8 |
| 50 mph | 22.3 |
| Standing ¼ mile | 25.4 |
| Speed at end of quarter | 52 mph |

**SPEED RANGES IN GEARS:**

| | |
|---|---|
| I | 0-16 |
| II | 9-30 |
| III | 14-47 |
| IV | 20-top |

**SPEEDOMETER CORRECTION:**

| Indicated Speed | Timed Speed |
|---|---|
| 20 | 18 |
| 30 | 28 |
| 40 | 37 |
| 50 | 46 |
| 60 | 55 |

**FUEL CONSUMPTION:** 35-48 mpg

**SPECIFICATIONS**

**POWER UNIT:**

Type .....Inclined vertical twin, forced air cooling
Valve Operation.....Connecting rod driven single overhead cam, inclined valves, rockers
Bore & Stroke......2.95x2.60 in (75x66 mm)
Stroke Bore Ratio ....................0.88/1
Displacement ...........35.6 cu in (583 cc)
Compression Ratio ....................6.8/1
Carburetion by .......Bing 7/26/1 downdraft
Max. Power ...............26 bhp @ 4800 rpm
Max. Torque ............30 lbs-ft @ 2250 rpm

**DRIVE TRAIN:**

| Transmission ratios | overall |
|---|---|
| I | 18.74 |
| II | 10.00 |
| III | 6.39 |
| IV | 4.52 |

**CHASSIS:**

Unitized body-frame of pressed and welded sheet steel panels
Wheelbase ............................78¾ in
Tread, front and rear ................47¼ in
Front Suspension....Independent, coil springs and unequal wishbones
Rear Suspension....Independent, swing axles, coil springs and single large wishbone
Shock absorbers......Tubular double acting, concentric with coil springs
Steering type ..................rack and pinion
Steering wheel turns L to L ...............2.4
Turning diameter, curb to curb ......28¼ ft
Brakes ............................7 inch drums
Brake lining area ...............approx 66 sq in
Tire size ..............................4.40x12

**GENERAL:**

Length .................................124 in
Width ....................................56 in
Height ...................................54 in
Curb weight ...........................1100 lbs
Weight, as tested .....................1375 lbs
Weight distribution, F/R as tested .....50/50
Fuel capacity ...............6.6 U.S. Gallons

**RATING FACTORS:**

Specific Power Output .........0.73 bhp/cu in
Power to Weight Ratio, as tested . 52.8 lbs/hp
Piston speed @ 60 mph ..........2020 ft/min
Braking Area, as tested .........96 sq in/ton (approx)
Speed @ 1000 rpm in top gear .......12.9 mph

► Though building racing cars may be more romantic, the creation of new small car designs is equally challenging and every bit as interesting if you know what to look for. With each new design that reaches these shores, it is instructive to seek in its home country the factors which have influenced its design.

NSU Werke of Neckarsulm, Germany have a long and honored history in the motorcycle business, including the occasional holding of motorcycle speed records. As a facet of the remarkable recovery of postwar Germany, they have augmented their cycle business by building Fiats of 5-, 6-, and 1100 cc's under license. One can only guess at what financial arrangements were involved with Fiat, but at any rate, they are now building their own design, the Prinz, and have dropped the 500.

Their reasons for doing this must have been strong ones because in many ways the two are quite similar; two-door sedans with air-cooled, vertical twins mounted in the rear. But the Prinz is no copy of the 500. In fact, as you inspect the car, the many intriguing details make it clear that the Neckarsulm designers also enjoyed the luxury of starting with a clean sheet of paper.

Uppermost in their minds were the needs, both real and imaginary, of the potential market. The surge of scooters in Germany peaked out about 1956. It then became evident that the now-prosperous Deutschers wanted to keep dry in the rain. After several sub-minicars had come and gone, it also became clear that they wanted a "real" car with room for the family, not just a scooter with a roof on it. In one sense, an up-to-date equivalent of the motorcycle with multi-passenger sidecar.

German insurance rates jump sharply when the rated DIN horsepower reaches 20, so just under this has become the norm for four-passenger cars of this type.

For economy of maintenance, a relatively large, under-stressed engine was chosen by NSU. What was more natural than to make a twin out of their successful Supermax single? An exciting feature here for an economy car is the single overhead camshaft. As in their bikes, it is driven by a pair of connecting rods, a technique that was used also on the 8-liter Bentley. Small rockers open the inclined valves. With hemispherical combustion chambers present, one needn't look far to find hopped-up engines about. No doubt there'll soon be some sporty Prinz sedans around. In fact, the NSU Werke will soon be exporting a 38 hp version with a sports two-seater coupe body, but even that output can be improved upon if reliability is not imperative.

The engine is built in unit with the transmission and final drive gears. As in the Bugatti 251, the crankshaft runs across the car and all connections are by spur gears. The whole compact package is carried in extra-soft rubber mounts to soak up the to-be-expected vibration of the four-stroke twin.

This leads to a difficulty though, as the unit moves on these mounts as the clutch is engaged, making fast, smooth starts difficult to achieve. Other problems are that first is difficult to find unless you pick it off while still approaching the stop sign. All speeds enjoy synchromesh but it's hardly silky smooth.

The engine seemed especially rough at low speeds but it pulled with the heart of a trouper in the mid-range, just as the peak torque speed of 2250 rpm would indicate. At peaking out speeds, the shrouded fan shrieks. Unless a home soundproofing job is done, even "cruising" at 60 becomes a bit tiring. To the driver, that is, for the car has that game quality which appeals to those intent on *driving* a car rather than merely being transported by it.

There are many other endearing features in the Prinz that more than compensate for its power train's shortcomings. Inside it has real room for two adults in front plus one more in the rear. In a pinch, two can ride in back, though children will enjoy it there more. This is based on knee-room, not head-room, for in miniaturizing a four-passenger, two-door sedan, NSU avoided the pitfall of assuming that the passengers would be smaller too. Headroom is outstanding.

Another nicety is the pivoting vent window at the rear. The windows in the front door slide open to save the space below for storage. Operating through a rack and pinion, the window handle is so far to the rear that one uses one's inboard hand to crank it.

The built-in heater put out a prodigious amount of heat (though it was warm weather when we sampled it) but the control knob was very unsatisfactory. We are assured that this is soon to be amended.

Other controls rate 100% and it's obvious that whoever laid out the cockpit knows how to drive and enjoys it, too.

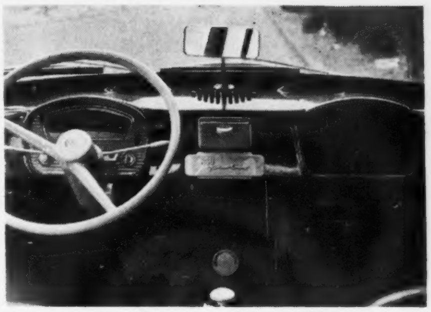
The seats are comfortable and so are the positions of the wheel and shift lever. The hand brake is right between the seats—surprise, it really works. A hand-choke is right in front of the shift lever for starting on chilly days.

There's only one instrument dial, the speedometer with odometer. Below it, five colored lights in a row care for, left to right, high beam, no charge, low oil pressure, low on gas, and turn indicator. The colors are respectively blue, red, green, yellow and orange. If while low on gas at night you should stall the engine at a turn, the display is colorful indeed.

Until warm, the engine is easy to stall. The air cooling system must be very effective as it takes longer than one expects to warm up this waterless engine.

There are two stalks growing out of the steering column, the one on the left is the usual turn indicator (non-cancelling) and the one on the right is a headlight dipper and flasher. There are some states, though, which require a foot-operated dip-switch. Too bad, as the existing unit gives excellent control. As a last touch, if you pull this last lever up toward the wheel rim, the horn blows. It's an interesting layout, for flashing your high beam (pull down) is another, quieter way to warn of your approach. After all, if it's good enough for Ferrari and Maserati, it's good enough for the Prinz.

Lots of storage places are provided, huge pockets in the doors, a moderate bin behind the seats and a trunk up front. Rectangular in shape, it will easily take a two-suiter case. The rear seat back folds down so the entire rear section can be devoted to baggage. Under the cushion lurks the 12-volt battery, well away from engine heat.



**Prinz instrumentation is very simple. With exception of speedometer all information is transmitted by colored lights—green, yellow, red.**

**Back of rear seat folds down to make Prinz into Grand Tourer for two.**

The body shell and the punt-like frame are made entirely of pressed steel. Their details, as well as those of the suspension arms indicate that the makers are fully in command of their material and completely up to date.

Large on the inside, the Prinz is small indeed on the outside. Overall length is four inches less than the current Chrysler's wheelbase, for instance. Combined with quick light steering, this solves most parking problems for you. The other phase is cared for by "export" bumperware which adds enough height to cope with those who back up 'till they hear glass.

At speed, the rack and pinion steering combines with impressively clever suspension layout to give a cornering manner that makes the Prinz fun to drive. Though the low maximum speed may contradict us, this would seem to be the key to characterizing this as a sports-sedan.

Ordinary swing-axle rears give rather violent changes from under to over-steer with bounce and rebound. On the Prinz this is minimized with a low-pivot arrangement as used on Mercedes and Porsche race cars. The drive shafts are splined at their inboard end. Each tubular wishbone provides the lateral and longitudinal location needed. Their pivot axes are below the engine, parallel and close to the center line. A vertically mounted and concentric coil spring and shock absorber complete the picture. By using a wide wishbone rather than supplementing a narrow one with a radius rod, changes of toe-in with bounce and rebound are completely eliminated. This leaves only camber changes and the attendant changes in side-loadability to bother the driver as he plays Fangio around bumpy bends.

Equally important in providing good handling is the front suspension. As on Mercedes and Chevrolets, it and the steering are attached to a cross beam which is assembled into the car at the factory as a unit. Layout is the traditional coil spring with unequal wishbones. Looks nice for someone building a super-small special, since geometry relationships are fixed relative to the cross-tube.

Comfort on jiggly roads is hardly a strong point on any small car, and the Prinz is no exception. If anything, the designers went out of their way to avoid a marshmallow-like, bounce-on-regardless ride, seeking instead for complete control under all conditions. The latter goal is one which sports car-minded buyers will admire. Better yet is how well NSU have accomplished it.

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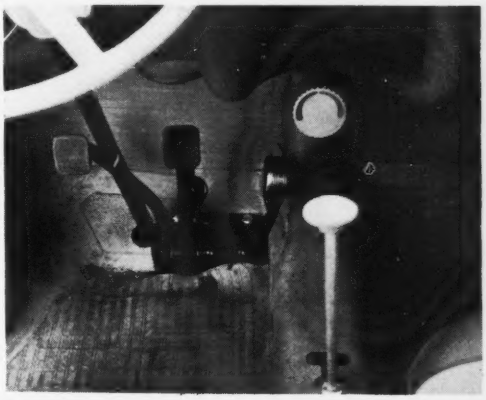
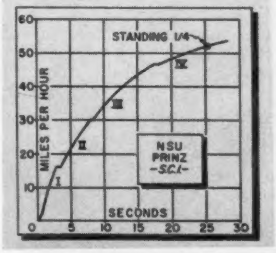





**Battery is under seat away from engine heat.**

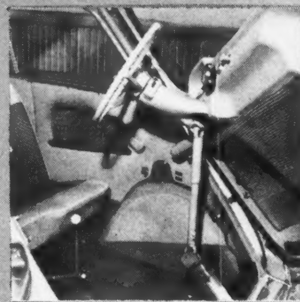
**Lurking under back lid is the NSU's sturdy two-cylinder two-cycle engine.**

**Foot room around pedals leaves something to be desired.**

# SCI ROAD TEST BMW 600


No the 600 is not an orthodox approach economy transportation. One thing that the front opening door forced on the designers—high-mounted head lights.

No matter how you look at it (above) BMW 600 is functional rather than "pretty". Side door (right) is for the use of rear seat passengers only.



BMW has a two-door body. Of course, one is hinged on the nose. If that isn't enough for the people who like the unusual the complete steering wheel and column swings up.

► However you expect to view BMW's 600 you must resolve for yourself and your purposes the suitability of the nose hatch. I don't intend to dwell on this aspect of the car, but it is certainly the BMW's most controversial feature and, indeed, the key to the car's whole layout. It should be obvious that the choice of the forward-opening front door for this vehicle (introduced in August, 1957) directly followed the availability of the door parts the Munich firm was already stamping out for its Isetta two-seater. BMW wanted to get into the burgeoning market for 600 cc cars at minimum cost, so the front door, front suspension and general constructional layout of the originally-Italian Isetta were transposed to a four-seater and powered by a detuned version of one of BMW's famed opposed-twin cycle engines.

You'll recall that the door arrangement on the Isetta was eminently justified by the very brief length of the car, which allowed it to be parked with nose to the curb so that driver and passenger could step right out onto the sidewalk. The much longer 600 is denied this privilege. Exit and entry must be made to and from street level, requiring no short step either way. There's also the slim but extant possibility that a car ahead may park close enough to make it difficult to open the door at all. Though its function is now less clear, then, the 600's front door is certainly well executed. Strong spring counterbalancing eases opening while a positive locking motion is necessary to clamp the husky latch shut. Stepping through the opening is not in itself difficult—it is aided by a convenient hand hold—but a fog light, as fitted to the test car, can be a real obstacle. It's also uncomfortable for the passenger to remain seated while the driver leaves or enters.

Several times during the test, onlookers remarked that they "just wouldn't trust a steering column that bent like that". The column in fact is deeply splined, heavily jointed and free from play or other idiosyncracies. Those concerned about the crash hazards of the extreme forward seating will

Minor engine controls (far left) are conveniently placed near the driver's left hand. Rear suspension utilizes rubber universal joints just inboard of the wheel hubs.

**Dashboard contains only one instrument—a speedometer. Other information is transmitted to the driver by winking lights. Jointed steering column is deeply splined, free from play**

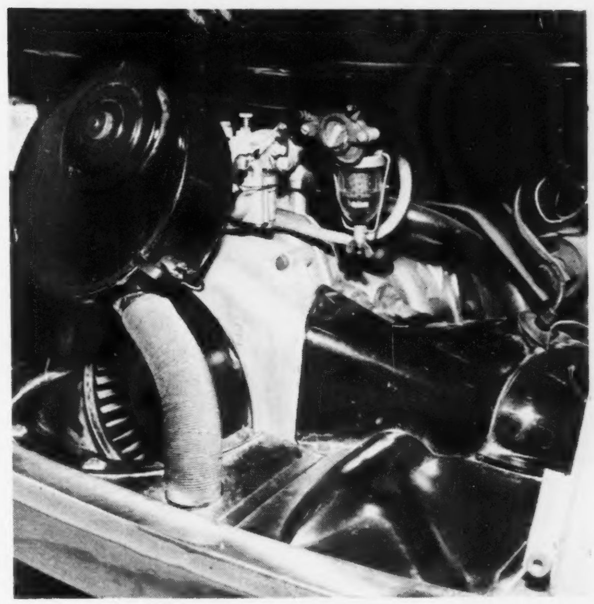
**BMW two-lunger is restricted to 19.5 bhp to come below line of German tax on horsepower. Competition 600s (!) run two carbs and many mods to belt out a solid 35 bhp**

be heartened by the very heavy tubular framing around the door opening (not to mention the sturdy front bumper) and by the subtle concealment of the spare wheel and tire within the door.

Though modestly cushioned, the seats are well shaped and angled, the back of the front seat having a distinct twin-bucket contour. An adjustment by wing-nuts over a five-inch range gives ample foot room for any driver, while head-room is better than in most full-sized sedans. The same goes for the back seat, which is some four inches wider than the front one, and which boasts leg room better than that in certain German cars of twice the displacement. There's suit-case-sized luggage space behind the seat which can be greatly extended by folding the seat back forward to form a load-carrying platform finished in rugged cloth. The single right rear door opens wide and allows comfortable access; it's lockable from the inside only. Its window is the only major one that doesn't open, while the driver's pane slides open considerably farther than the right front and left rear.

Expectations of a bus-like driving position are put to rest by the well-angled position of the rather small wheel. The sole instrument is a speedometer which also houses lights for "generator charge" and the directional signals. The latter are activated by a lever at the right of the column, an upward tug on the same stick serving to sound the horn. A similar prong on the left dims and flashes the headlights. Handy to the driver's left hand is a cluster of round-knobbed levers including the choke, the off-on-reserve fuel tap (turn off for extended parking to prevent drip from the carb), and the heater control. Of heat there is aplenty, ducted direct to the feet of the front and rear occupants and to the left side of the windshield for fast and thorough defrosting. Vision all around is very good, with the exceptions of the thick front pillars and the rear view mirror, which can block the forward view of a tall driver. Altogether the driver feels very much at home and in control of his vehicle inside the 600.

*(Continued on page 88)*




Air-cooled twin (above) is pretty well hidden by light sheet metal shrouds. Louvers (left) in back deck admit engine air.

# THE DOWN FALL OF AMALGAMATED PIZZA

***What happens when Detroit builds a three-liter Pignatelli.***

***by Robert G. Lurie***

▶ "What is this?" said the Minister of State of the Italian Republic. "What kind of democracy is this? Is this a country or a reformatory?"

He said it to the press, he said it to the Ambassador from the United States, he even said it to his wife that night. But all his righteous anger couldn't put a stop to the fact that Big Dino Partelli was being deported to Italy. And Italy had to take him, even though he had learned how to run the rackets in America, having left sunny Sicily at the age of four.

Actually, Big Dino wasn't being deported for arson, larceny, murder or rape. No one – not even J. Edgar Hoover – could prove anything like that. Aside from a bum income tax rap, the only thing on Dino's record was a Health Department fine for running a dirty sarsaparilla bottling plant back in 1923. When he walked down the gangplank at Livorno, he was a very respectable man indeed; President of the Foreign Car Dealers Association of the U. S., chief executive officer of the Automobile Importers Institute; Head of Automobiles Pignatelli (U.S.A.) Corporation. And he was met by the Charley Lucky himself, the most famous of the deportees, who – among his many interests – owned the Pignatelli Factory in Turin. The place where the fastest racing, sports and gran turismo cars in the world are made, and exported to America.

You might ask how Big Dino got to be such a wheel in the foreign car business, when his whole life had been devoted to artichokes, waterfront unions and extortion. The only cars he had even ridden in were Cadillacs, and he always had a large and well-armed chauffeur to drive these. Of course, they all had coach-built bodies, but this was necessary to support the weight of extra-heavy bullet-proof windows, rather than for rakish styling.

Big Dino was known as a foreign car expert because W. C. Fields once said, "You can't cheat an honest man." Dino really took this to heart.

So when Dino first looked around for a businessmen's association to organize, he went after the juke box trade. When he got out of the hospital (Longie Z. paid the entire bill, just to show there were no hard feelings) he decided that organizing the juke box trade was too competitive. He looked around for another business and discovered foreign cars. He interviewed a few dealers around the country and found that indeed you can't cheat an honest man. Inside of a year he had a good protection business going, and all those titles stood for a tidy income with no more work than a couple of visits now and then to dealers who thought their franchises came from the factories. Then Charley Lucky named him to import Pignatellis – and every Pig had to be disassembled on arrival. Someone trustworthy had to remove the kilo packs of white powder from the deDion tubes and cylinder bores.

You can imagine that Dino was quite irritated by the FBI and the Immigration people when they put him on the boat. He snarled he'd be back. At the time, he didn't know what truth he was telling. But just one month to the day he *was* back – on a special immigration permit arranged by Harlowe C. H. Cruikshank, Chairman of the Board of Amalgamated Motors, the largest automotive firm in the whole world.

What happened was that Amalgamated Motors had finally gotten around to producing a small car. All the public opinion surveys recommended it. So they did it. It was the biggest flop since the Chrysler Airflow. There was hell to pay at Amalgamated. Old Harlow C. H. fired everybody. Then he called in his Vice President of Personnel and growled, "Get me a foreign car man. The head of their association. Get him. By tomorrow."

They made Dino a Vice President of Amalgamated – in charge of the small car division.

Now, as has been said, Dino didn't know a thing about automobiles, but this has been standard for Detroit V.P.'s since old Henry changed to the Model A. In addition, he was very much respected around the Downtown Athletic Club, because he never went anywhere without his two large dark Italian friends, who were very scarey guys indeed. That's how Dino managed to make the Vice Presidents of Styling and Cost-Accounting so cooperative when he tooled up the new Amalgamated small car.

Finally, after less than six months of crash program, the Amalgamated small car hit the market. It was the most dazzling success ever to come out of the Motor City. It was beautiful. Lithe as a cheetah. Accelerated zero to sixty in 5.2 seconds. Stuck like glue. And it sold for $1875 including extras. It was rumored to cost Amalgamated more than $12,000 per car, but mass production would take care of that. As a matter of fact, it was actually a three-liter Gran Turismo Pignatelli, with radio and heater.

By the end of the year, Amalgamated had sold 584 units of its five makes of big cars – and 290,000 Pigs. Even the State Police had to switch to them in order to catch the speeders. Americans learned to downshift, to drift corners, to change oil. They had *fun* again! Everybody was happy except Ford, Chrysler and Volkswagen. And they were against the wall. Chrysler was for sale. Ford cancelled the Omnibus TV show.

Next thing, Mr. Dino Partelli was elected President of Amalgamated. He bought the whole Chrysler Corporation for $150 in cash and 287 million dollars worth of non-voting warranty certificates, due in 1989. The Chrysler executives originally wanted Amalgamated stock, but when Dino and his boys – he had *five* large, dark well-armed friends with him by then – arrived at the meeting, they soon convinced the Chrysler people that the warranty certificates were much prettier – and healthier, too!

Ford was another matter. They wouldn't be bought up. Even after young Mr. F. had that nasty accident. Ford decided to compete with Amalgamated on its own grounds. They re-instated the Omnibus Show. They announced the greatest small car in history. They hired all seven Bandareni brothers to design the running gear. They got Piazza Pharina to do the body. And Collins Chapworth to put it all together. The car was to be fabricated of nylon, epoxy resins and stressed sawdust. Every moving part in the engine was machined tungsten. It was to be a wham-dinger! It had to be to outsell the Pigs that were blasting over every road in America.

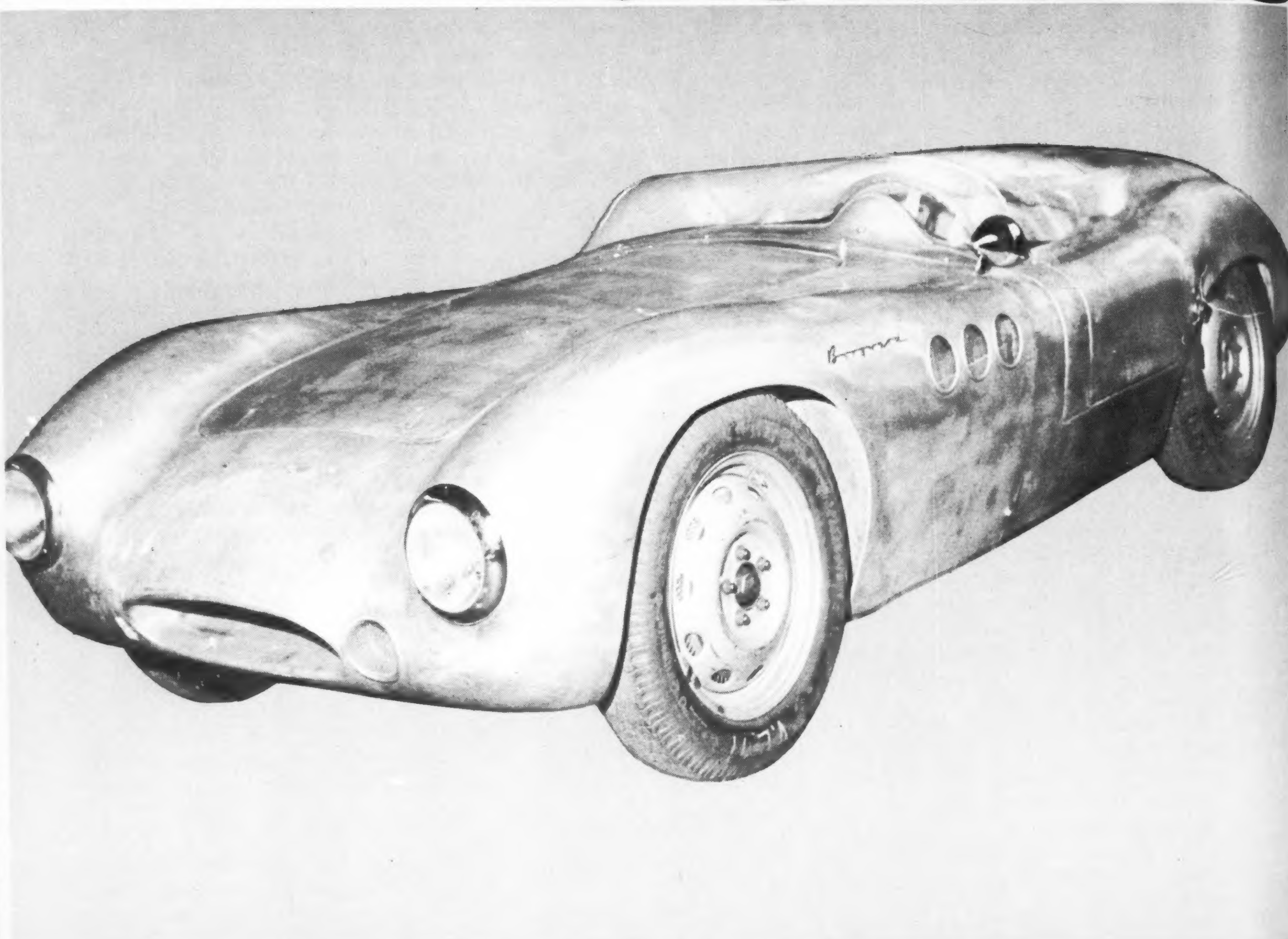
Two weeks after their arrival in Detroit all seven Bandareni brothers disappeared. No trace was ever found. They were last seen being escorted on a Lake Michigan fishing trip by one of Big Dino's large dark friends. Witnesses claimed that he carried his fishing rods in a violin case.

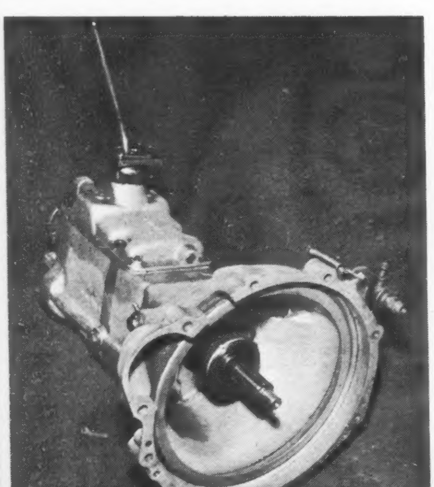
Not much after that, Pharina had a nervous breakdown and retired to Capri for a long, long rest. Doctor's orders. Chapworth stayed around Detroit a while longer. But when Hollywood called, off he went. They wanted him as a technical expert for "Son of Mrs. Miniver." Seems that one of the scenes called for a Bullnose Morris in the background.

No one ever found out what happened to the Bandareni brothers' drawings, or Pharina's styling mock-up or Chapworth's chassis-cum-suspension. Nevertheless, Ford *did* produce a small car. When it hit the showrooms, the public came to see. Then they went over to the nearest Amalgamated dealer and bought a Pig. The Ford small car looked like a 1937 Ford coupe – the 60 horsepower model. But exactly.

After this fiasco, Ford announced it was going back to the tractor business. Exclusively. There was only one company left in Detroit, and that was Amalgamated. Only the corporate name had been changed by its new chairman, Mr. B. D. Partelli. Changed to Amalgamated-P.I.Z.Z.A. – Partelli Industrial Zygomatic Zonal Automotives. It was listed on the big board simply as "Amal-Pizza." And it went from 37 to 206 in two months. *(Continued on page 98)*

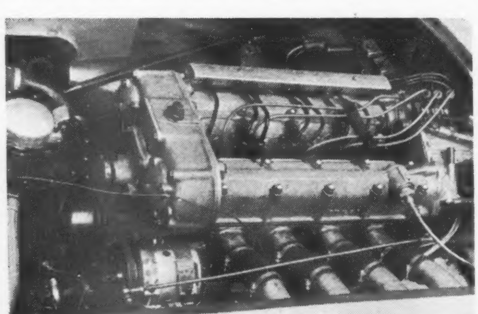
# *WINNER ON STOLEN TIME:* BORGWARD RS

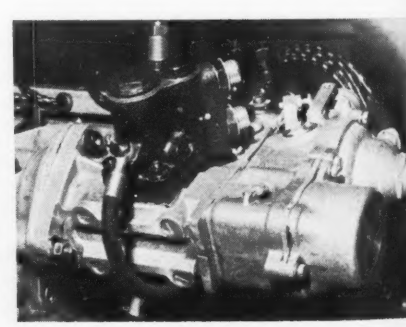




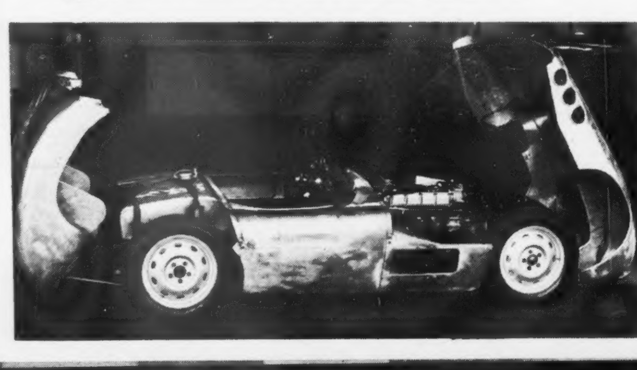
Above: Magnesium bell housing contains hydraulically operated Fichtel and Sachs clutch. Right: The space-frame car built and wrecked in 1957. Exhaust layout and fuel tank differ on the new car.

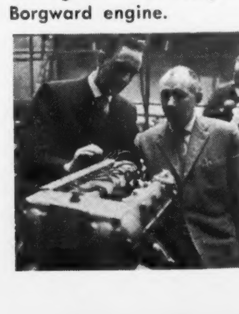
Below: RS engine as seen at the Nurburgring in magnesium bodied car. Note size of generator.

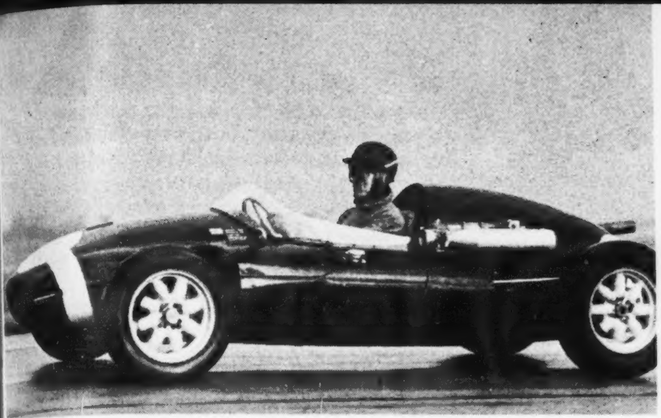




Above: Bosch injector pump mounted at rear of cylinder head. Below: On left Ing. Buchner and on right Karl Ludwig Brandt, designer of the Borgward engine.







Fritz Juttner tries out initial Cooper installation on Bremen-Hamburg autobahn. Car is Rob Walker's Monaco winner, 1957 type. Intake air box protrudes from hood.

*by Karl Ludvigsen*

► "We're not like Daimler-Benz, who periodically turn their whole technical strength toward racing for powerful commercial reasons. Nor do we resemble Porsche, who build cars and race them out of sheer enthusiasm. We're Borgward, where time and money to build racing cars must literally be stolen — when possible — from our prodigious car and truck development programs." Thus spake Zarathustra, in the person of Research Director Büchner, the individual directly responsible for the overall design of the recently renowned Borgward sports/racing cars.

Büchner was in a position to clarify the precarious stand of sports cars at the Bremen-Sebaldsbrück factory, but he could hardly have amplified on the most elusive variable in the whole equation: Carl F. W. Borgward himself. Now in his seventies, Borgward completely controls the Borgward/Goliath/Lloyd combine with a hand still iron in its authority but now and then capricious in its actions. Borgward's main interest is styling, which he personally directs and more than often actually executes, tending to leave engineering and production relatively on their own. Nevertheless any individual program can be activated or disbanded at his whim, a state of affairs which makes it impractical to predict developments up Bremen way. Against this background, Büchner has had marvelous success in constructing a modest yet practical and extremely effective racing organization. How effective? In German racing circles they still speak with enthusiasm of the Avus race in October last year, when the Borgwards "really showed what they could do". In two events Bonnier with the latest RS gave no quarter to Behra and Gregory in works Porsches (the latter in the lighter Formula II car), finishing a snappy eight-tenths of a second behind Behra after 206 miles of racing which moved Richard von Frankenberg to comment, "Between Borgward and Porsche only the smallest horsepower difference must exist, apparently so small that nuances of adjustment and gearbox ratios, and above all the technical and tactical know-how of the driver, are decisive". And this with a car some 200 pounds heavier than the Porsche!

As long ago as 1951 Borgward began development of a racing sports car with a chassis identical in most basic respects to that still in use seven years later. Attributed to Fleischer, now Chief Engineer of Goliath, the frame is a simple lozenge-shaped platform of tubes about three inches in diameter, tapering inward at front and rear to the respective suspension assemblies. While one early experiment was extensive drilling of these tubes — especially the two central crossmembers — it later proved necessary to erect small-tube trusses along each side for additional stiffness. In an attempt to get away from the admittedly excessive weight of this bastardized frame, a very nice engine space-type or "geodetic" frame was built in 1957, saving as much as 40 pounds. Unfortunately Jüttner wrapped up that one car during tests at the 'Ring, and there wasn't time to build another.

Fleischer also gets credit for the straightforward de Dion rear suspension used in all racing Borgwards. A tube curving behind the final drive is located by trailing arms beneath the hubs plus a single upper "V" arm which trails from an arc erected over the driveshaft, supplying both fore-and-aft guidance and high-roll-center lateral location. Large-diameter coil springs contact the de Dion tube directly just inboard of the vertically-placed Fichtel and Sachs tubular shocks, both reacting against fabricated "antlers" arcing up from the frame. The short half-shafts have conventional Hooke-type joints, the boots once covering the sliding splines now being removed. Supplied by the old Hansa 1800, the final drive unit is frame-mounted at four points and carries spiral bevel gearing which is not easily changed away from the Bremen shops. Experience led to two degrees of negative camber for the rear wheels.

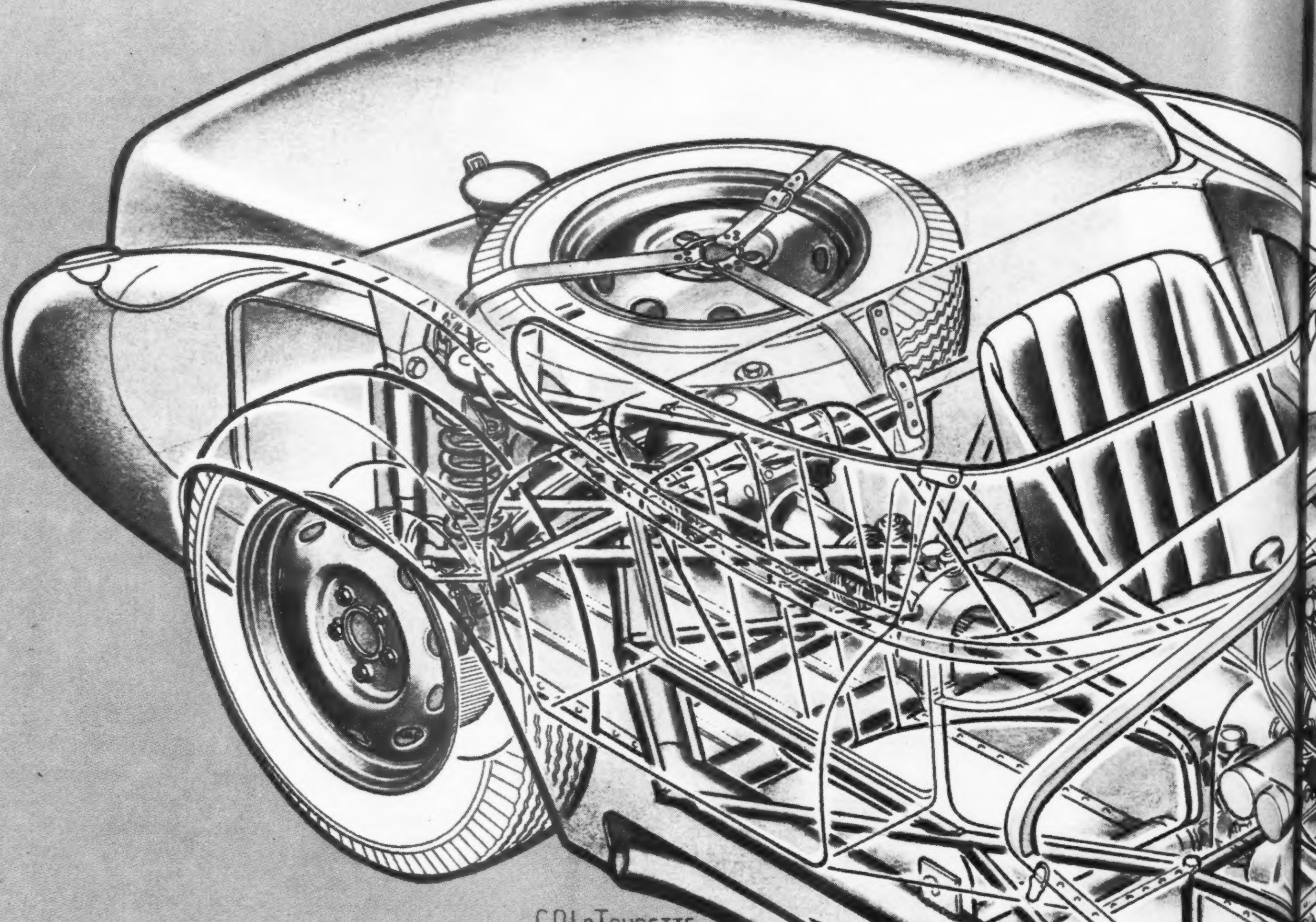
Front suspension has always been based on production components, the Isabella stamped wishbones of post-1954 being incorporated in the improved sports car chassis of 1956. They're usually used in standard trim, the polished finish seen on the space-frame car being the exception. Springing chores are again handled by big coils, this time leaning slightly inward and encircling the dampers, with an assist from a torsion anti-roll bar between the wishbones and behind the wheel centers. Like many other current passenger cars, the Isabella suspension hedges on ball joints by fitting them at the lightly-loaded top wishbones while retaining two-way threaded trunnions at the bottom.

Both trailing and leading steering arms have been fitted, the latter being the latest choice in conjunction with a three-part track rod activated by a ZF-Gemmer gearbox. The pivot of the right-hand slave arm extends upward to a short lever which is restrained by a tubular damper which stabilizes the steering feel on bumpy surfaces.

Twin master cylinders apply the Teves brakes, built under Lockheed patents with two leading shoes at the front. Bonded to steel shoes, the Energit linings are pressed against Al-Fin drums of surprisingly small dimensions buried in the five-stud disc wheels. Turbo-finning of the front drums may conjure up some air movement, but the venting of the drum face and drilling of the backing plate must have reduced weight much more than they induced breezes. With the notable exception of Mercedes, it's not unfair to say that German racing brakes are generally at a low state of development, a situation that has always handicapped non-Untertürkheim German cars in international competition.

The standard RS Borgward body is fashioned of aluminum in the modern idiom, with main front and rear sections which hinge forward and backward to expose everything except the cockpit interior. Conventional hood and "trunk" openings are also provided for hastier adjustments, while portholes and vents along the fenders exhaust hot air from the engine room. Air enters through a ducted opening whose size has been progressively decreased, and which is flanked by a cool air intake to the induction system. For 1958 the paneling layout was simplified and hammered out of magnesium, saving 55 important pounds on one car — no chance to build more! Carl Borgward's latest pet project, a helicopter (Lycoming-powered), brought Prof. Focke into the house. As a byproduct the good Professor improved the nose and tail shapes, adopting the Kamm-type "Manx" tail for the Avus race. As is usual in German cars the cockpit is given a near-production degree of finish, set off well by the dished Nardi steering wheel.

At a dry weight of 1386 pounds for the standard version the RS has been far from light, such *Konkurrenz* as the RSK Porsche, Cooper Monaco and "standard" Osca hovering around the 1150 pound mark with the Lotus XV rather below this. Borgward brass realized that with the space frame, magnesium body and like measures they could trim weight close to the 1200 mark, but they were not naïve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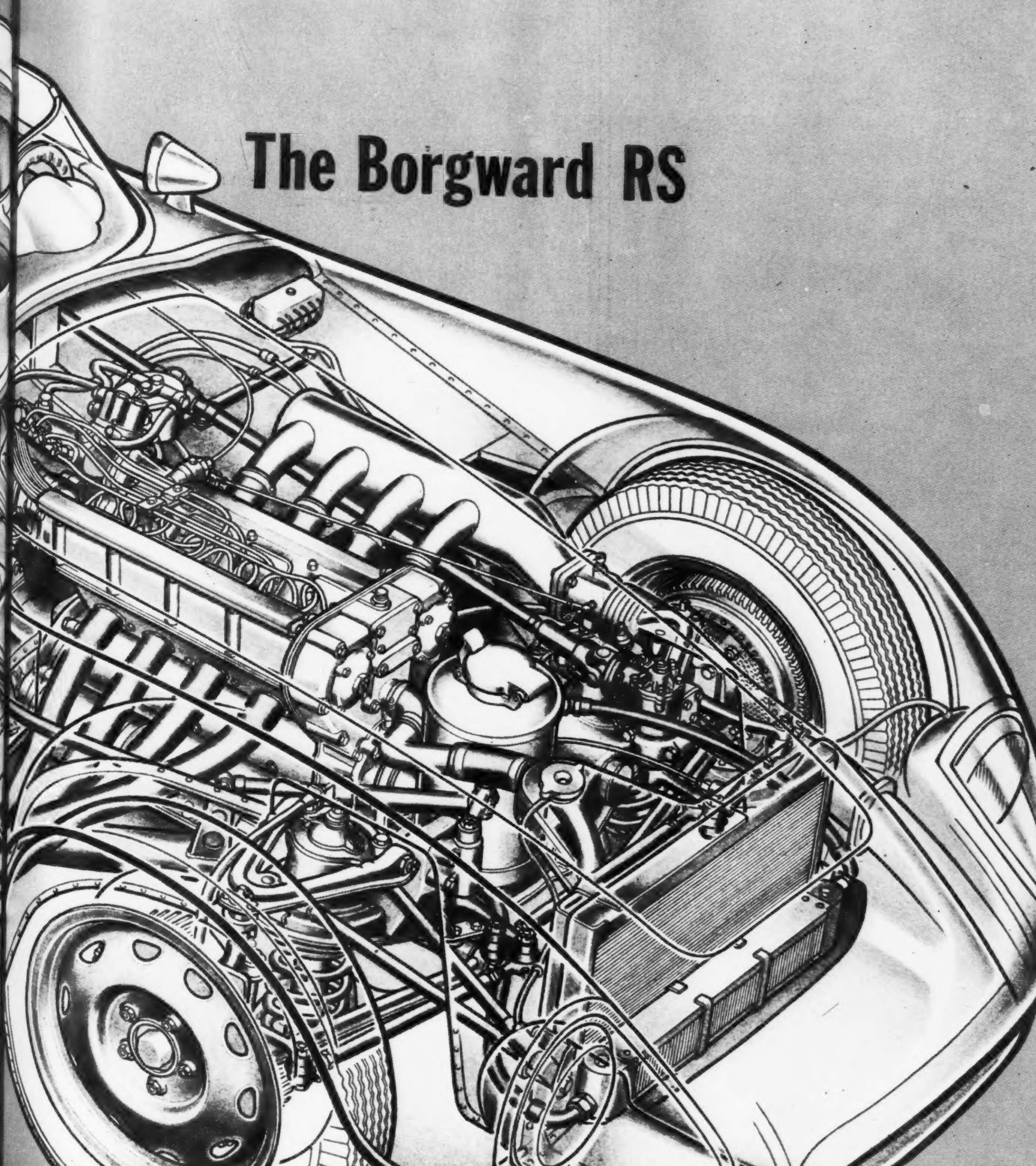
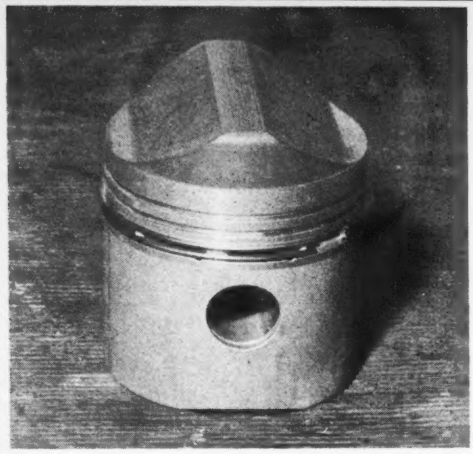
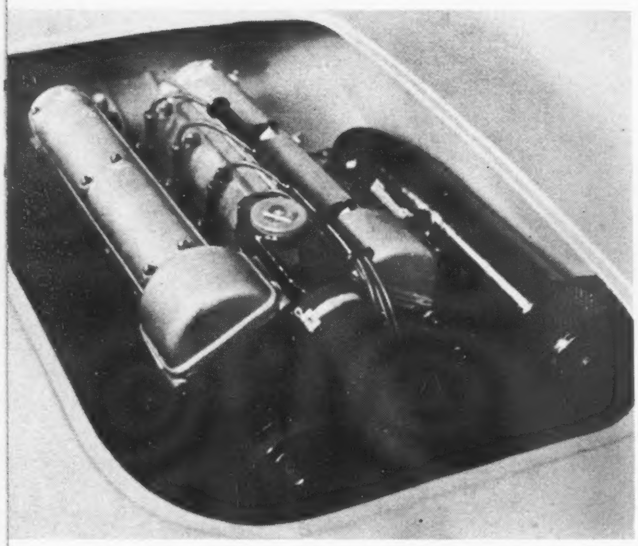
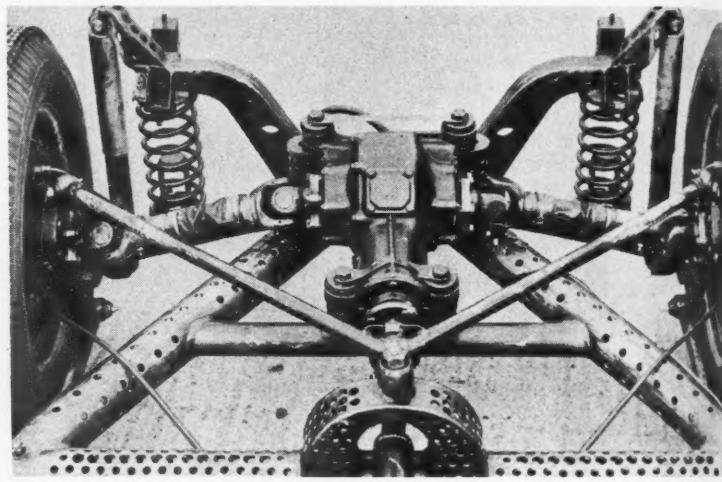
# The Borgward RS



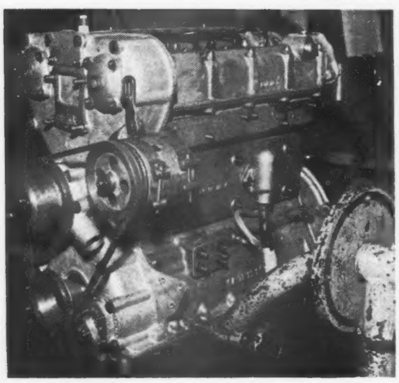


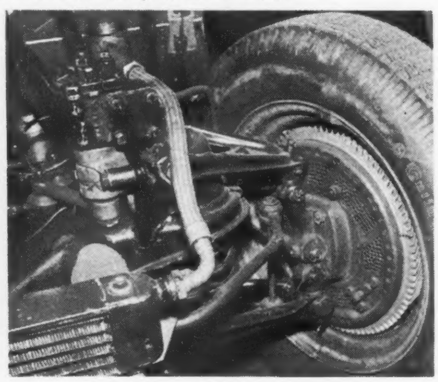
Left: Unpainted aluminum bodied car. Wide scoop is for cooling air, smaller hole for engine air. Above: Crown of forged piston is specially treated to retard erosion.

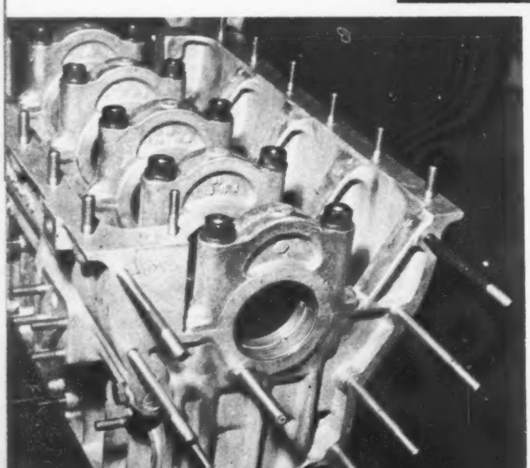




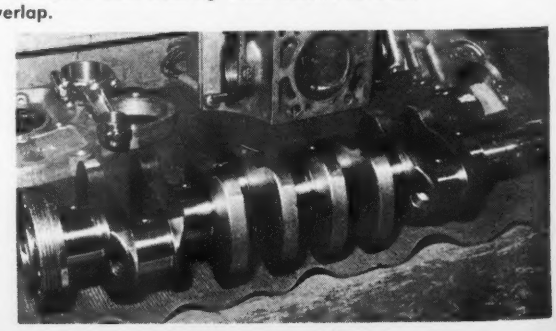
Above: de Dion rear end of '52 car is about same today.
The first double overhead cam Borgward engine was outstanding for its tidy exterior. Power plant was first shown at the 1951 Frankfort show. It was tried on the test bed, but never raced.







Above left: Engine being prepared for Cooper installation. Plate carrying cam drive sprockets extends to act as front engine mounts. Above right: Steering box, Isabella suspension, oil cooler and drilled Teves brake with Al-Fin drum are featured. Left: Underside of block, seen from front, shows rugged deep construction with massive main bearing webs. Below: RS crank is massive, with generous overlap.



enough to think that the competition would stand still and wait for them to catch up. For this basic reason plus, we suspect, overriding demands of production development, Borgward withdrew the sports cars in 1959 — although they would turn over a car or two to a qualified individual who wanted to go racing: Stirling Moss, for example. It could happen.

In the meantime, the car's engine has had its lease on life renewed by arrangements between Borgward and Rob Walker, Stirling Moss Ltd., and the British Racing Partnership (Alfred Moss), all negotiated by Ken Gregory. Early in 1959 four engines were being prepared for these groups to install in Cooper Formula II chassis, with a total supply of eight engines being likely this year. Though it weighs 25 pounds more than the Climax four, the Bremen engine delivers a bonus of about 20 horses, neatly pulling the rug from under the market for the British powerplants. Actually Borgward is "lending" their engines to the British stables, along with full factory technical aid and a liaison man in the person of Fritz Jüttner, combination driver/mechanic.

Another good reason for sitting back and taking stock is the new 1961 formula, which is tailor-made for Borgward's backlog of experience. Büchner indicated that the firm has every intention of entering Grand Prix racing at that time, and definitely with the same basic engine now used in the Coopers — a move that will obviously yield useful data for the Borgward single-seater of the future, by the way. From every angle the engine of the RS Borgward stands out as its most remarkable feature, and is thus worth an extensive discussion here.

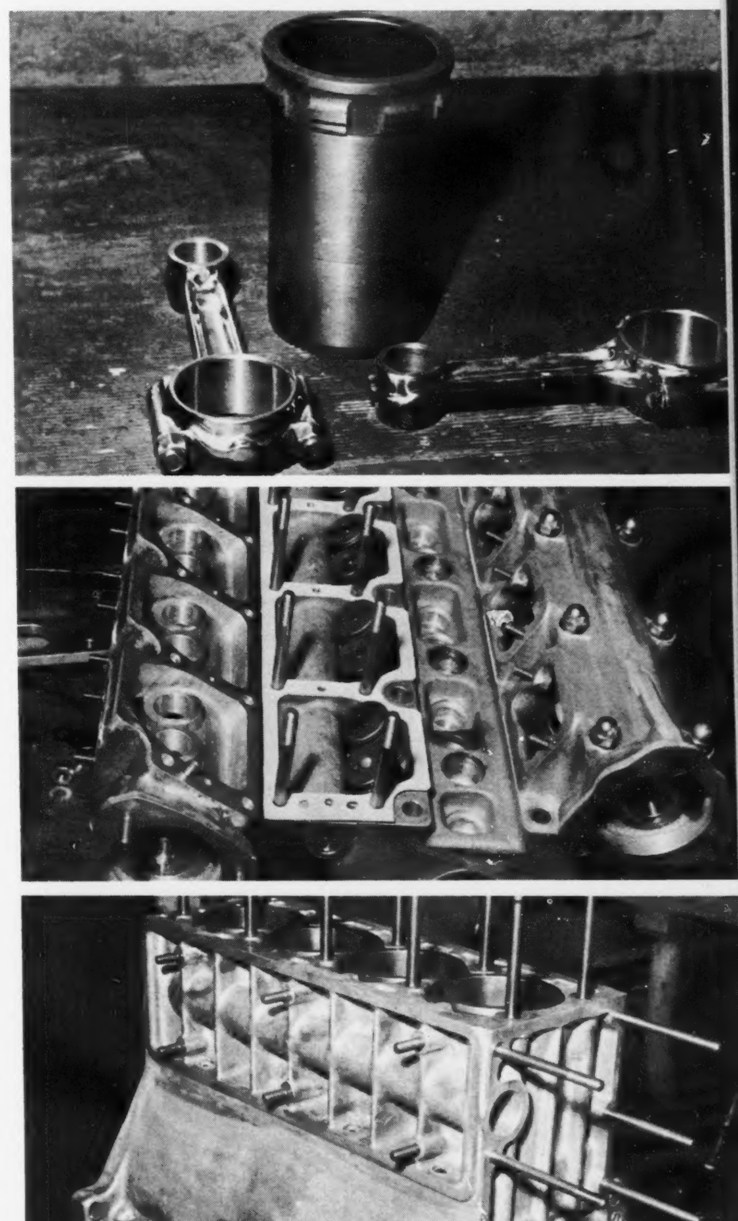
First we should be acquainted with Borgward's Chief Engine Designer, Karl Ludwig Brandt. Stubby and still athletic at 52, bachelor Brandt is betrayed by outsized hands that indicate the natural feel for machinery that has guided him unerringly to potent and practical engine layouts in spite of his lack of the customary Technical High School background. With but five draftsmen he's responsible for the whole range of Borgward car and truck gasoline and diesel engines, a task that has left little time for exotic experiments with sports/racing engines. He got more than a taste of high-performance goods with the BMW experimental department before the war, however. In '38 he succeeded in extracting ten more horses from the famed 328 engine by fitting a Bosch injector, mounting the nozzles so that they crossed within the long siamesed intake ports.

After Fleischer had experimented briefly with a special sixteen-valve four that made excessive demands on its bottom end, Brandt entered the picture in 1952 with a new alloy head for the then-current Hansa 1500, featuring hemispherical chambers and inclined valves actuated by pushrods and rockers Chrysler-style. Siamesed downdraft intake ports were capped by twin carbs, giving good breathing but not allowing ram tuning. By 1954 this head had been transferred to the shorter-stroke Isabella block and outfitted with injection nozzles. Brandt wanted them spang in the middle of the chamber hemisphere but couldn't because the space was pre-empted by the valves, so he set them to one side and angled them in two planes, getting the right position and spray pattern only after much experimenting. The original drawing showed separate throttles for each of the ports, but this was avoided as too complex and one side-facing throttle assembly installed on an inverted "U" manifold. An unbeautiful gear set drove the Bosch pump from the crank nose. Thus equipped the Borgwards performed well in the Mexican Road Race and at home, delivering a meaty 116 bhp on alcohol fuel — very nearly twice the standard Isabella rating!

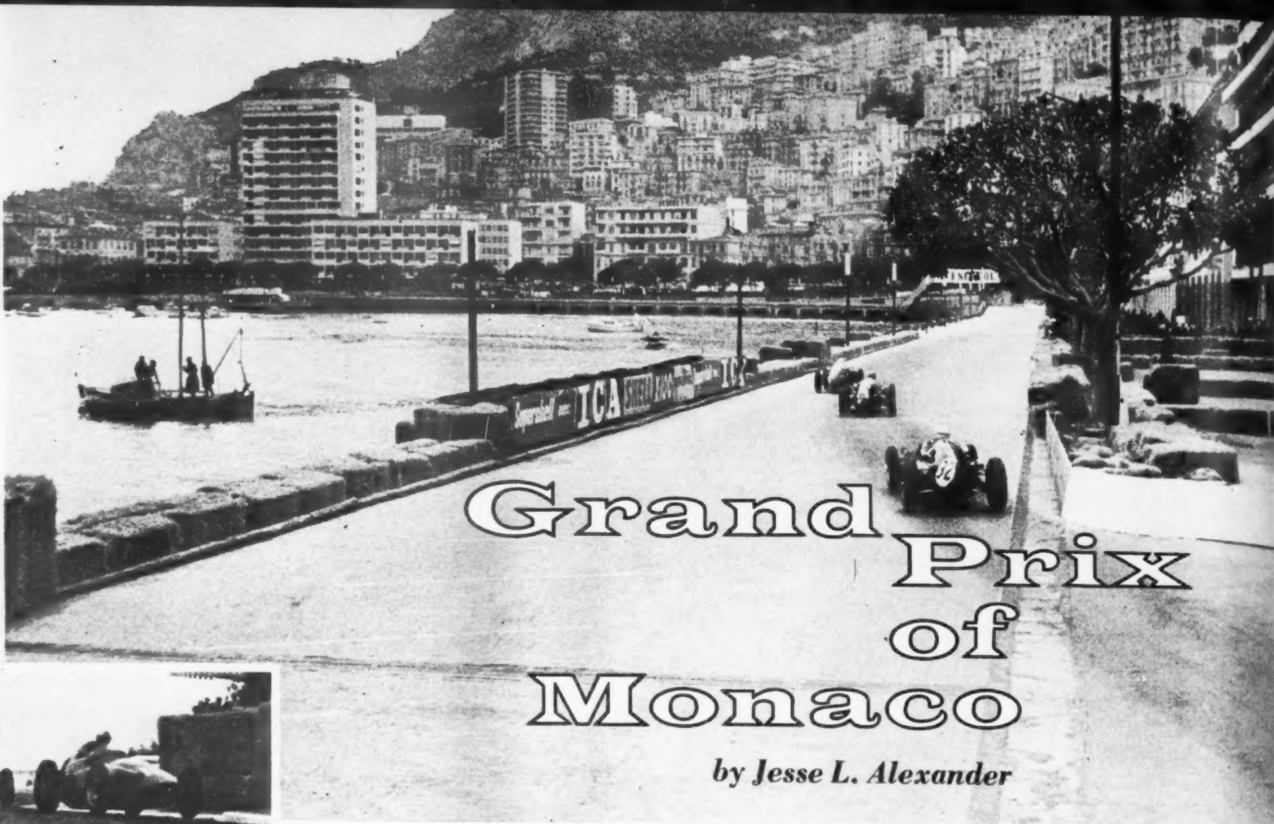
When he took a break in 1955 to design a new engine for Borgward race cars, Brandt planned it specifically to be suitable for production; eventually, he hopes, for a small high-performance sports car. Thus an overwhelmingly practical outlook prevails throughout the engine, though they never did get around to building the fan that appears on the first drawings (a glance at the water pump will show where it was to be mounted, and perhaps will be). An early indication of Brandt's viewpoint is the forged crankshaft running in trimetal Glyco bearing shells, instead of the rollers and Hirth shaft so beloved of German designers. Astoundingly this shaft was laid out by experience alone, without calculations, to use the main bearing shells then fitted to the now-discontinued six-cylinder Hansa 2400; main journal size is 2.36 inches. There's room between the five mains and the 1.97 inch rod journals for amply-dimensioned cheeks each carrying a counterweight.

Likewise the forged rods have modest I-section shanks and are close kin to production parts, expensive oilway drilling to the small end being avoided. In actual fact these

*(Continued on page 91)*



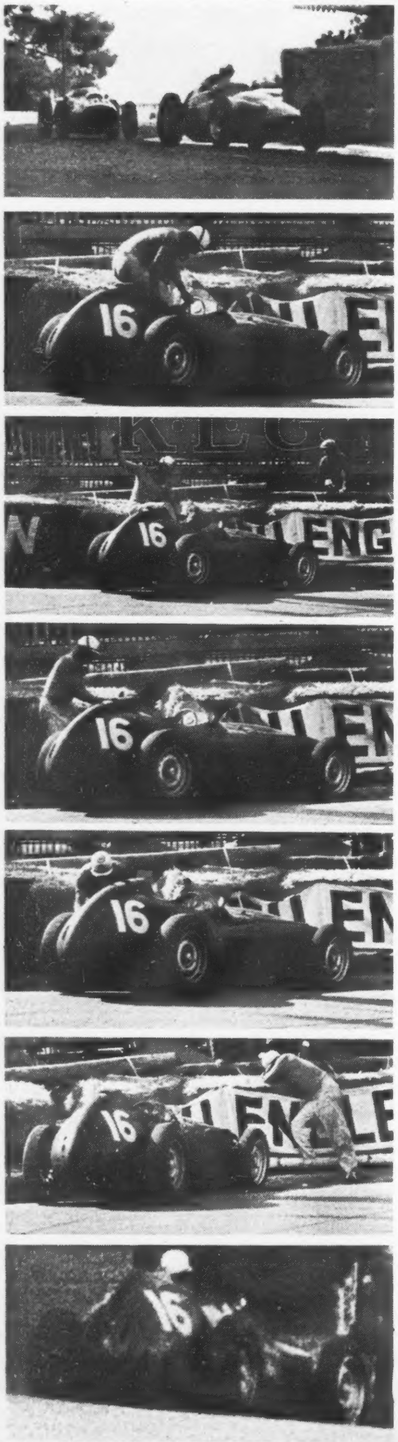
**Top: Cylinder liner is very husky especially at the top where it's clamped between flange and feet. Lower third is better finished where it fits block closely. Rods are conventional in design, polished to a high gloss. Middle: Cam is housed in one-piece detachable carrier, seen here without cam or small tappets. Machining of head upper surface is very easy. Bottom: Right side of block without cover plate shows cast-in water intake manifold, placement of wet liners in block.**





# Grand Prix of Monaco

*by Jesse L. Alexander*



**BRM driver Harry Schell goes into the straw in front of the Casino after being pressed by one of the Ferraris. His histrionics after the shunt were worth the price of admission.**

► With only 16 starters allowed on the grid in 1959's first championship Formula I and II event at Monaco last May, the three practice periods proved to be hot and hairy as everybody did their darndest to qualify. Tony Brooks set the pace with the 2.5 Ferrari on the first day but scared himself a bit by spinning as he exited from the famous tunnel. The black marks left on the road were mighty impressive —he even flew up onto the sidewalk at one point in the skid. It's a miracle that the Ferrari did not flip, let alone touch anything solid.

All three Ferraris as well as the Formula II car had followed Vanwall's example of last year but cutting off the nose projection by a foot or so; thus if there was a shunt, this would decrease the chances of the cooling system being plugged up by bent metal. As it turned out during the race this worked perfectly, particularly for Phil Hill who slammed his car into the bales more than just once at the Casino, the wheels and tires taking most of the punishment. More on this later.

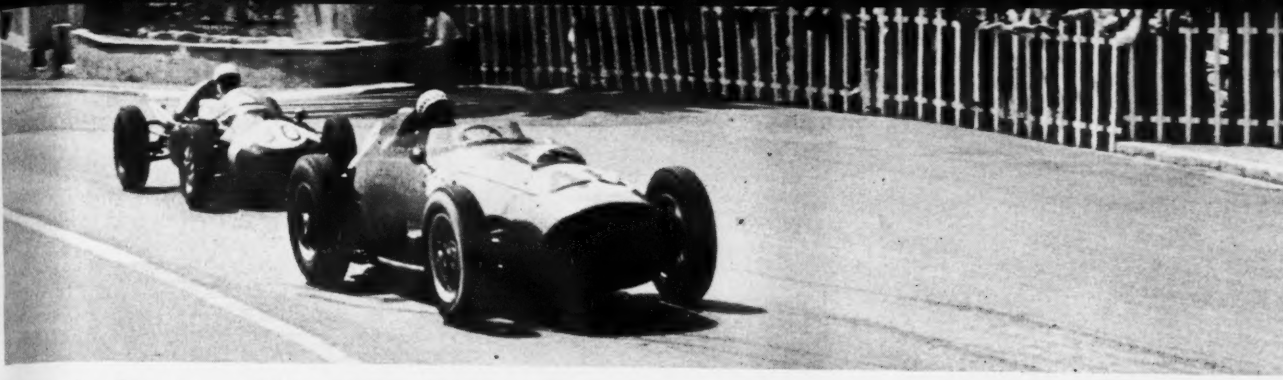
Jean Behra was going like he had never gone before, both in training and in the first twenty laps of the race holding off Moss and Brabham, but his outstanding training lap of 1'40" flat sent Moss out to do him one better. Stirling cut a cool 1'39.6" to take fastest training lap in the Cooper-Climax. (Last year's fastest training round was 1'40" by Hawthorn). Many people after the race commented on Behra's fine exhibition of driving but what no one really knows except Behra himself is just how hard he was really flogging that Ferrari to keep ahead of Moss. The rev counter tell tales on all the Ferraris were stuck at nine thousand after it was over, but Behra's car lasted just 20 laps with 80 more to go. Official word was a blown piston, confirmed later by a friendly mechanic.

No question but that the 1959 Formula I Ferrari is not nearly as pretty as last year's car but it *does* go. The Dunlop discs make it stop handsomely as well and several more horses have been extricated from the twin-cam Dino V-6. Officially it's rated at 280-285 bhp. Recent alterations to the roll center made the car a bit of a handfull at Monaco with the final oversteer coming in very late and very suddenly. They seemed rough and wiggly in most corners.

Cliff Allison had been given the Formula II Ferrari but had all he could do to qualify. He just managed to squeeze under the wire with the help of an engine switch Saturday night. Cliff is fast, but the Formula II Ferrari is distinctly heavier than its competitors thus there was a bit more than a second between his own training time and that of Von Trips in the new 1.5 Porsche. Wolfgang finally turned in a handsome 1'43.8", which incidentally was one tenth of a second faster than Graham Hill's time in the 2.5-liter Lotus.

There were so many Coopers at Monaco that it was a major effort for most reporters to keep them all straight. Rob Walker brought three 2.5-liter cars, one for Trintignant, one for Moss, both Climax powered, plus the Cooper-BRM which was only on a trial basis, Moss doing only 2 practice laps in the car. Handling difficulties plus a few minor hitches in the Colotti gearbox kept it on the sidelines but it's hoped that these problems will be sorted out before Zandvoort. Roy Salvadori was driving a privately owned Cooper-Maserati; Jack Brabham had one of the 2.5-liter works cars while Gregory and McLaren had 2-liter machines. Both Masten Gregory and Maurice Trintignant looked very good in practice. Unfortunately Gregory's gearbox packed up very early in the race. Trint finished a very regular and commendable third.

Stirling Moss was of course sensational in the 2.5 Cooper-Climax, particularly when he set the new training record of 1'39.6". What impressed us however, was the display of driving put up by Jack

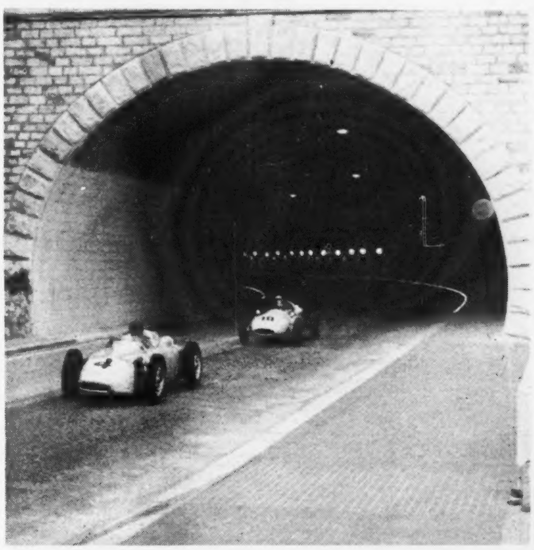


ABOVE: The Coopers were ideally suited to the course. Here, Moss chases a Ferrari. BELOW: Cooper-Mounted winner, Jack Brabham.


Brabham—Australia's "Wunderkind". Jack looks to us like another Moss. He's almost as steady and smooth as Moss is today but still not quite as fast.

The Owen Racing Organization arrived with a group of the latest type BRM's—changes since last year include slightly altered cylinder heads to improve gas flow, rearranged valve gear, a five main bearing crankshaft and Dunlop disc brakes. The BRM is giving about 280 bhp and is just about on equal terms with the Ferrari in pure acceleration. Bonnier is without a doubt the fastest current BRM driver, turning in a very creditable 1'42.3" in training. The BRMs retired with various malfunctions—Bonnier had a leaking rear caliper on his discs but also stalled the car on the circuit and was unable to restart. Harry Schell spun and broke his oil radiator. Ron Flockhart just spun and shunted himself. BRM needs Moss very much as a steady driver but recent mechanical malfunctions have not inspired Stirling to take a permanent job with the Bourne outfit.

By far the biggest sensation during practice was the arrival upon the scene of a brand new *red* Opel truck from Stuttgart within which rested the surprise of the season—the Porsche Formula II car, a brand new effort. It's engine was not yet completely cool from tests the day before on the Nürburgring where Von Trips set a new Formula II record—a sizzling 9'29.8 —if the car is turning such fast laps in its preliminary state, there's no telling what it's going to be cutting six months from now. Basically the car has borrowed the wheelbase, together with the front and rear tracks from the RSK (2100 mm, 1290, 1250 mm). With but a single seat and no door to worry about, they were able to design a narrow space frame. Front suspension is RSK while at the rear Porsche have fitted the non-parallel A-frame system that was on one of the works Sebring cars. Easy to adjust—simple yet rugged, the system is not necessarily new



A Porsche and Cooper echo through the tunnel that leads into the short straight along the harbor.

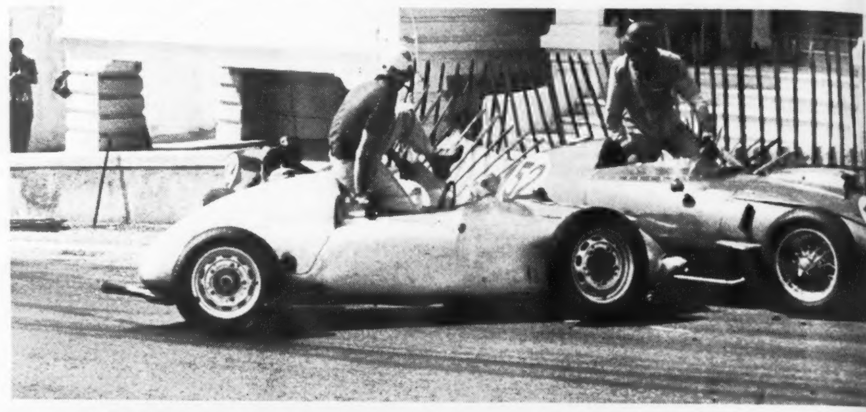
A tired Jack Brabham receives the victor's wreath and silver.

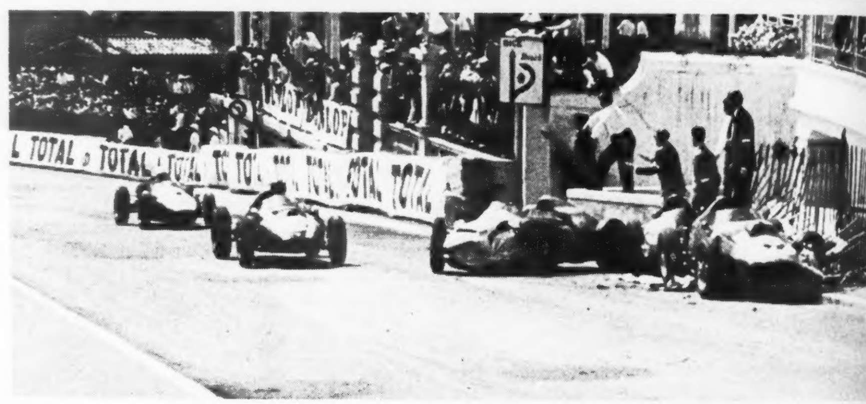
but unique on a Porsche. We'll let the tech ed take you on a tour of the new P-wagen at a later date but suffice to say that the car is a goer, weighs some 75 pounds less than the RSK and in training at Monaco, proved to be a tenth of a second faster than Graham Hill's 2.5-liter Lotus. A conventional 1½-liter RSK Spyder engine is fitted to the car with a six-speed gearbox. (Reverse has been removed and a sixth forward speed inserted at the end of the box). Not surprising also, is the fact that the weight of the new FII Porsche is below the accepted minimum for Formula I cars in 1961—500 kg.

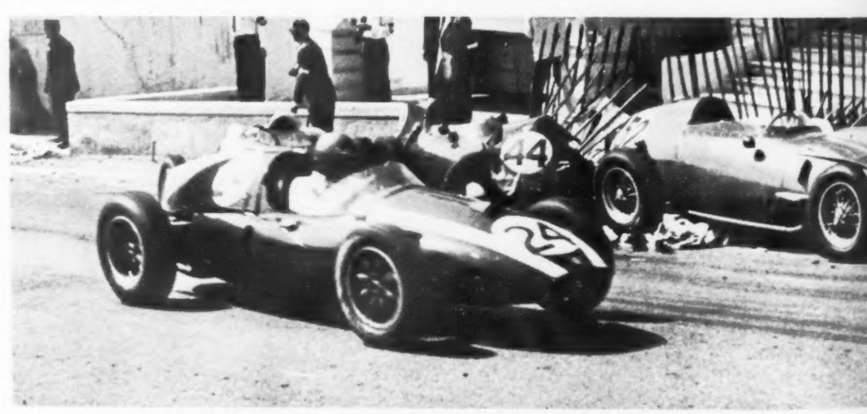
There was another single seater Porsche at Monaco. This one the private project of Jean Behra but unfortunately since Behra could not drive it himself and Maria Theresa diFillipis was not quick enough to qualify, the car did not start on Sunday. We talked to Porsche driver-engineer Edgar Barth who had driven both the new works Porsche as well as Behra's. Barth was of the opinion that the weights of both cars were practically the same and that Behra's machine understeers more than the car from Zuffenhausen, therefore it would not have been as suitable at Monaco where considerable oversteer is a desirable characteristic, in order to be able to fling the car around sharp corners. Barth took the Behra car out for a few laps and was seen to be working very hard cranking extra lock on the wheel on the sharper turns.

The unfortunate shunt involving all three Formula II cars in the second lap of the race at San Devote corner was almost too much for those who had been at Monza in September last year. There on the opening laps, Von Trips initiated an accident at Lesmo wiping out his Ferrari and seriously damaging Schell's BRM. This time Trips left the road at San Devote purely because he was too fast—certainly the track was slippery but it was bound to get a lot more slippery by the time 100 laps of the Grand Prix race had been completed. Starting around on the second lap and going very fast, Trips was up in the middle of the pack, well ahead of the other Formula II machinery. As he came out of San Devote and headed up the hill toward the Casino the car went wide, hooked a haybale and bent a wheel. The car was left with the tail sticking out on the course. Around the bend came Cliff Allison going like the hammers. He said later he saw the Porsche and realized he couldn't get by. He also realized he could easily hit the Trips car in the cockpit where Trips still sat so he opted for the bales and the nose of the Porsche. No sooner had the dust and hay started to settle than Bruce Halford slammed his F-II Lotus smack-dab in between the other two cars. The Formula II section of the first Grande Epreuve of the season had lasted exactly a lap and a quarter.

The F-I race was fast and furious from beginning to end. After Behra's Ferrari packed up, Moss led Brabham until Stirling's crown wheel and pinion went up the spout and it was Australia's Jack Brabham in the lead. Tony Brooks made a bad start in his Ferrari but by half distance was in third place, gaining a second every lap on Brabham. Twenty laps later Moss was out and Brabham began to feel







**The Formula II race lasted exactly a lap and a quarter. All three F II cars wound up in a ball at the San Devote Corner after Von Trips' car haybaled to a stop.**

the pressure of the Ferrari. Jack merely leaned on the Cooper a bit harder and came up with a sensational ftd on the 83rd lap of 1'40.4". Brooks was beginning to be effected by heat and fuel fumes seeping into the cockpit of his Ferrari. From then on the race was in Brabham's pocket, Brooks taking second, Trintignant third, Phil Hill fourth, and Bruce McLaren fifth. Salvadori limped home 17 laps in arrears for sixth.

Brooks wasn't the only Ferrari driver to feel the effects of heat and fumes. Phil Hill had really been suffering for the better part of the race; his judgment processes were so upset that he misjudged three times in the same place, spinning slam-bang into the bales the same way each time at Casino corner.

What apparently happened was that the pavement on the inner edge of the turn started to break up early in the race. As things progressed the whole turn in front of the Hotel De Paris and the Casino became covered with marble-sized rocks, smaller pebbles and bits of broken macadam. The only clear patch was the groove which led right over the spot where the pavement was coming unglued. Hill, obviously tired and groggy, came up the course and swept around the turn too wide. He hit the loose stuff and spun tail first into the mountain of bales that protected the spectator stands. The car coasted away, allowing Phil to straighten out and get started down the hill toward the station. Two laps went by and then WHAM, he did it again. And again he got away. A few laps later he looped it but this time missed the bales and merely went on.

Meanwhile Harry Schell had been booting the BRM, working his way up through until he had passed his team-mate Bonnier and blasted into third spot. Probably he spotted his name on the scoreboard which listed the first three—at any rate he seemed to shove his foot just a little deeper into the gasworks. Just a shade too deep. Coming into the marbled turn he did just what Phil Hill had done except that the BRM went straight in without spinning, hooking a wheel over the wooden base that held the bales. He hopped out of the car and struggled to push it free, apparently not noticing the hooked wheel. Waving his arms and shouting imprecations, he pleaded for help from photographers, officials and everybody within earshot but nobody could help since assistance meant automatic disqualification. Finally after emptying a liter of water over his head from a bottle handed him by an official he succeded in freeing the car but it wouldn't start. He coasted away toward the railroad station where he finally abandoned the car.

While all this was going on, Joe Bonnier had stopped the other BRM at the pits to complain of a weakening brake system. Sent on his way he came swooping up on the corner where Schell was struggling with his BRM. Bonnier pulled to a halt with the engine running in neutral, saw he couldn't help and, waved on by an official, started to take off—and stalled the car dead! Either the BRM won't restart on a hill or it wouldn't coast fast enough to turn the engine over but at any rate it wouldn't start. He, too, was forced to abandon the car on the course. Thus ended the BRM threat.

Brooks, sick from fumes and heat but still dead game, worked his way into third and then second as Moss's car packed up and Brabham went into first some 40 seconds ahead. Trintignant pulled a steady third, gained when Phil Hill went into the bales.

The Ferraris were at a considerable disadvantage at Monaco. The rear-engined cars allowed their drivers to breathe cool, fresh air constantly. Speeds on the 'round the houses circuit also did not get up high enough for any extended period for the drivers to relax on a long straight-away or to be able to suck on the cockpit flask.

For the spectators, the race was exciting for the first twenty laps but after that it's safe to say that 80% of them were bored stiff. Such is one of the problems of contemporary GP racing—the 1959 Monaco race was for 100 laps, (300 km.) minimum distance for a Grand Epreuve or 198 miles and out of the sixteen starters only six finished! Summing up, Hill, Behra and Brooks did their very best but let's face it: John Cooper had the odds in his favor. *—jla*

**Results; 1959 Grand Prix de Monaco, May 10, 1959.**

**1 lap—1.98 miles, distance—100 laps.**

**1. Jack Brabham (2.5 Cooper-Climax) 2 hr. 55 min, 51.3"—66.74 mph.**

**2. Tony Brooks (2.5 Ferrari) 2 hr. 56 min., 11.7".**

**3. Maurice Trintignant (Cooper-Climax) 2 laps behind.**

**4. Phil Hill (2.5 Ferrari) 3 laps behind.**

**5. Bruce McLaren (2.2 Cooper-Climax) 4 laps behind.**

**6. Roy Salvadori (2.5 Cooper-Maserati) 17 laps behind.**

**Fastest lap; Brabham (Cooper) 1 min. 40.4".**

**Practice qualifying times:**

| | |
|---|---|
| Stirling Moss (Cooper-Climax) | 1'39.6" |
| Jean Behra (Ferrari) | 1'40 |
| Jack Brabham (Cooper-Climax) | 1'40.7" |
| Tony Brooks (Ferrari) | 1'41 |
| Phil Hill (Ferrari) | 1'41.3" |
| Maurice Trintignant (Cooper) | 1'41.7" |
| Joakim Bonnier (BRM) | 1'42.3" |
| Roy Salvadori (Cooper-Maserati) | 1'42.4" |
| Harry Schell (BRM) | 1'42.8" |
| Ron Flockhart (BRM) | 1'43.1" |
| Masten Gregory (Cooper) | 1'43.2" |
| Wolfgang von Trips (Porsche) | 1'43.8" |
| Graham Hill (Lotus) | 1'43.9" |
| Bruce Maclaren (Cooper) | 1'43.9" |
| Cliff Allison (Ferrari) | 1'44.4" |
| Bruce Halford (Lotus) | 1'44.8" |


**ABOVE: Porsche special owned, but not operated by Jean Behra, showed a great deal of promise. Lack of a driver kept it out of the running. Moss' Cooper chewed up its crown wheel and pinion, and was out after 20 laps. BELOW: American Masten Gregory had tenth fastest practice time, however, his gearbox packed in the race.**

SCI ROAD TEST

# Singer Gazelle Series II Convertible

▶ Ten days after the Singer Gazelle Series III had been introduced to the American market at the New York International Auto Show our road test of the car was complete and we motored the streets of Beverly Hills, discussing test findings with Brian Rootes, managing director of the firm that makes Hillman, Singer, Sunbeam and Humber. Mr. Rootes was in a glowing mood. Business in Britain was booming due to greatly reduced purchase tax and he had left New York with $23 million worth of orders in his briefcase. Rootes' American trade had doubled in a year and prospects were better than ever. That the firm's car are better than ever had much to do with this flourishing state of affairs.

The Series III Gazelle shares its basic components with the popular Hillman but costs about $150 more; the POE price of the Singer four-door sedan is $2095 and the convertible is $2349. The additional $150 goes entirely into making the Singer a luxury-economy car. The adjectives in this case are far from being mutually exclusive.

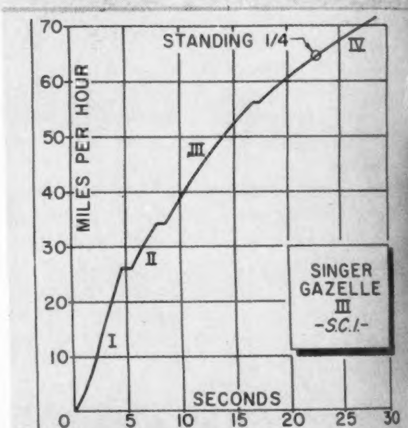
The Singer has its own distinctive, attractive appearance and is not to be confused with its lower-priced stable mate. The maroon finish and chrome on our test car were excellent. The interior sets a new standard for good looks, practicability and comfort in British cars in this general class. We generally avoid use of the architectural anglicism "facia" but in this case "instrument panel" is not appropriate to the expanse of walnut burl which extends across the front of the passenger compartment. In the interest of adaptability to left- or right-hand drive the generous cluster of legible instruments is centered on the facia, which is not as desirable a location as one directly in front of the driver.

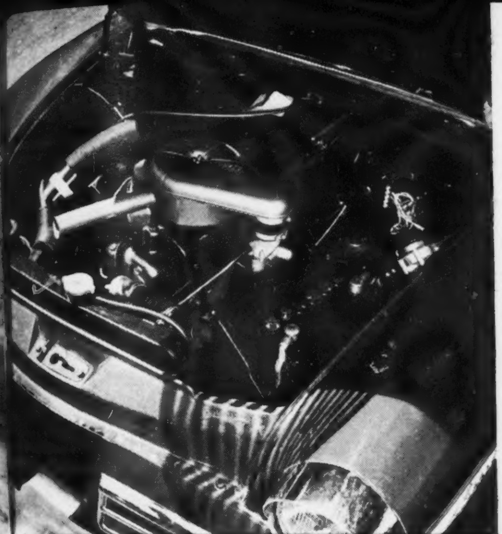
The front seat area abounds in storage space. Below the instrument cluster is a roomy little compartment for articles of cigarette-pack size. In front of the passenger is a large, roomy, lockable so-called glove compartment. In front of the driver and under the facia is an even larger parcel tray, to use yet another semantic blur. The effect of a gaping bin is erased by use of black flocking. Lips on the edges of the open storage space discourage the ejection of contents under sharp acceleration.

The heater and vent controls are handy and simple to operate and at full-on the heater can drive you out of the car in a handful of minutes. Large ash trays are provided for front and back seat users. The deep upholstery is covered with handsome, pleated, vinyl, an adoption of Stateside practice that will be appreciated here.

The Gazelle is a nearly faultless car and if there is to be argument about it it is likely to be focussed on the car's engine or, more accurately, on the one that isn't there. The former power plant was the single overhead cam Singer unit; now it's the Rootes rocker arm engine. Long-standing Singer fans and advocates of overhead cams *per se* tend to lament the change. But there are strong factors in its favor. First, there is reliability. The well-proved, long-developed Hillman engine leaves nothing to be desired here, while the sohc Singer engine has its critics on this score.

Next there is price. The Singer engine was much more expensive to build and the changeover to the Rootes engine made possible a big reduction in the price of the car. Then there is maintenance. Rootes has over 750 dealers in the U.S. (served by six major parts depots) and proportional swarms of them in Canada and Mexico. So, you can tour the entire continent in a Rootes-engined Singer and never



Above: Rootes engine provides pleasant performance, silent operation is helped by underhood padding.
Right: The Gazelle shows no excessive lean in corners, but does understeer slightly.

Below: With the top fully closed, the Singer is weather tight and comfortable. In-between position leaves front seat open while covering the rear.

**SINGER GAZELLE SERIES III CONVERTIBLE**

**TEST CONDITIONS:**

| | |
|---|---|
| Number aboard | One |
| Top position | Up, Windows Closed |
| Temperature | 76° F. |
| Etc. | 1700 miles on odo at start of speed runs |

**PERFORMANCE**

**TOP SPEED:**

| | |
|---|---|
| Two-way average | 83.1 mph |

**ACCELERATION:**

| From zero to | Secs. |
|---|---|
| 30 mph | 6.6 |
| 40 mph | 10.3 |
| 50 mph | 13.8 |
| 60 mph | 19.4 |
| 70 mph | 27.5 |
| 80 mph | 43.5 |
| Standing ¼ mile | 22.7 |
| Speed at end of quarter | 64 mph (actual) |

**SPEED RANGES IN GEARS:**

| | |
|---|---|
| I | zero to 28 |
| II | zero to 34 |
| III | 7 to 56 |
| IV | 15 to top |

**SPEEDOMETER CORRECTIONS:**

| Indicated | Actual |
|---|---|
| 30 | 30 |
| 40 | 36 |
| 50 | 46 |
| 60 | 56 |
| 70 | 66 |
| 80 | 76 |

**FUEL CONSUMPTION:**

| | mpg. |
|---|---|
| Hard driving | 19.9 |
| Average driving (under 60 mph) | 26 |

**SPECIFICATIONS**

**POWER UNIT:**

| | |
|---|---|
| Type | In-line four, water cooled |
| Valve Arrangement | Pushrod ohv |
| Bore & Stroke | 3.11 x 3.00 in (79.0 x 76.2 mm) |
| Bore/Stroke Ratio | 0.99/1 |
| Displacement | 91.16 cu in (1494 cc) |
| Compression Ratio | 8.5/1 |
| Carburetion by | Single downdraft Solex 32PB10 |
| Max. Power | 66 bhp @ 4500 rpm |
| Max. Torque | 82.0 lbs-ft @ 2300 rpm |
| Idle Speed | 500 rpm |

**DRIVE TRAIN:**

| Transmission ratios | | (overall) |
|---|---|---|
| I | 3.18 | 15.20 |
| II | 2.47 | 11.80 |
| III | 1.49 | 7.13 |
| IV | 1.00 | 4.78 |
| Final drive ratio | 4.78 | |
| Axle torque taken by | Leaf springs | |

**CHASSIS:**

| | |
|---|---|
| Wheelbase | 96 in |
| Tread, front and rear | 48½ in |
| Suspension, front | Independent, coil and wishbone |
| Suspension, rear | Rigid axle, semi-elliptic leaf springs |
| Shock absorbers | Armstrong telescopic |
| Steering type | Recirculating ball |
| Steering wheel turns L to L | 3.5 |
| Turning diameter | 34.5 ft |
| Brake type | Lockheed hydraulic |
| Brake lining area | 121 sq in |
| Tire size | 500/560 – 15 |

**GENERAL:**

| | |
|---|---|
| Length | 163 in |
| Width | 61 in |
| Height | 58 in |
| Weight, test car | 2380; with driver 2545 |
| Weight distribution, F/R | 55.8/44.2 |
| Fuel capacity | 12 U.S. gallons |

**RATING FACTORS:**

| | |
|---|---|
| Specific Power Output | 0.66 bhp/cu in |
| Power to Weight Ratio | 39.6 lbs/hp |
| Piston Speed @ 60 mph | 2035 ft/min |
| Braking Area | 95 sq in/ton |
| Speed @ 1000 rpm in top gear | 15.2 mph |

be far from parts and service if they are needed.

Finally, there is the matter of performance. With the Rootes engine the Gazelle goes significantly more quickly, which would seem to spell the last word in the argument. With the former engine the car would do zero to 60 in about 23.2. Our test car did it in 19.4.

The Rootes engine is remarkably smooth and, as installed in the Gazelle, is startling for its silence. At idle it's frequently necessary to glance at the oil pressure gauge to make sure that the engine is running. Cruising at 70 mph the loudest noises are the hum of the tires and drive line.

Peak horsepower is developed at 4500 rpm but the engine will willingly wind out to 5600 or so before valve float is approached. Our entire test was run on non-premium fuel. There was no detonation and only rarely did the engine run on for a couple of revs after the ignition had been switched off. During acceleration tests which, as you will see, were twice as lengthy as normal, there was no significant rise in water temperature, which is notable.

In the pre-war period some American cars were equipped with four-speed gearboxes, the extra cog being a compound low gear kept in reserve for stump pulling emergencies. Rootes transmissions follow the same practice of making first an emergency gear which, in conjunction with a small-displacement, small torque engine, makes a good deal of sense. Even so, the Gazelle could be driven for its lifetime without once engaging first. Our test car easily pulled a 30 per cent grade in second, its normal starting gear.

This unusual selection of ration produces an oddly shaped acceleration curve. To get optimum elapsed times we made all acceleration runs both with and without the use of first gear. It is possible to go only about five mph faster in second than in first and we proved that equally quick times are to be had with either system. What is gained by the elimination of one shift is cancelled out by the reduced thrust in second. As always, our acceleration runs were made using racing starts, letting the clutch out against a high-revving flywheel. In first the car digs out with instantaneous bite and will leave plenty of rubber behind it if the clutch is engaged too abruptly. In second, the car's static inertia pulls engine revs down and there is momentary bogging in getting off the line. For jack-rabbiting in traffic it pays to use first; otherwise, that gear is just as well ignored.

This was the most smoothly-functioning Rootes column shift we have used to date and generally was quite pleasant. However it occasionally would balk in some positions. Also, occasionally the crossover motion to the plane of third-fourth would be completed at the steering column without being completed in the gearbox. You happily attempt to throw the lever into third position and find yourself in a losing argument with non-synchro first. This should be correctable through linkage adjustment.

As the data table shows, the acceleration times of the Series III Gazelle are very

*(Continued on page 82)*

"I don't know how the man does it. Every time he makes a change it's a winner and this one is the best of the lot."

This was an executive of a huge imported car firm talking. The reference was to Donald Healey and his Austin-Healeys. The allusion to winning was not made to races but to public acceptance of the product although in truth he could have said the same thing in that context.

When it comes to designing a car that will have people standing in line to buy, Mr. Healey ranks with the great men of the day — the likes of the Porsches, father and son — and very few others.

The reasons for this, at least as far as the American market is concerned, are far from complex. Each version from the BN-1 to the newest BN-7, subject of this test, has been a *sports* car in every sense of the word. Second, they have from the beginning been priced within reason; in fact it's hard to see how one can buy more car for the money. Finally, Healey has used his knowledge of the American likes and dislikes to full advantage. We Americans, he knows, are used to sheer, solid torque and a wide power range in our cars, giving gobs of acceleration off the mark or away from a stoplight. Every Austin-Healey built has, for its displacement, been a draggin' fool, especially the later six-cylinder versions. The final American preference is for a car that will cruise effortlessly at fairly high and steady average speeds over superhighways and freeways. Healey offers an overdrive to provide this aspect and the proof of the thinking is shown by the fact that by far the largest slice of the A-H pie sold in the U.S. is overdrive equipped.

The latest Austin-Healey, which, as you read this, is being introduced in this country embodies all of these factors and carries them to a new high. There are 26 more pounds/feet of torque and 15 more horses, the figures being 149 lbs/ft at 3000 rpm and 130 bhp at 4750 rpm respectively. This has been accomplished by the simple expedient of increasing the bore to 3.282 inches which brings the displacement out to 171 cubic inches or 2912 cc and as an added bonus also ups the compression ratio to 9.03 to 1 since the same head is used. The stroke remains the same at 3.5 inches.

This is the major change and it can be felt in the seat of the pants by those familiar with earlier models. The main effect is that low rpm performance is increased tremendously. The new A-H 3000 can be lugged from a standstill in second gear with no effort and will muddle through five mile-an-hour traffic all day in that gear without protest. Ten miles an hour is no particular strain in third and fourth gear and be used for anything from a shade under 20 mph to top speed. Another effect is that rapid acceleration is done in that tremendous rush-without-clamor that marks the American V8, the only noises being a low booming exhaust note and an unobjectionable buzz from the gearbox in the two lower gears. Torque is such that on a really rapid take-off there is a chirp from the rear tires every time a gear is changed except into fourth.

For a sports car, the revs are not high. This is not a "winding" type of engine, being red-lined at 5200 rpm, but it doesn't

# ROAD TEST AUSTIN HEALEY 3000

U.S. Importer ....Hambro Autotomotive Corp.
27 W. 57th St., New York 22, N. Y.

## PERFORMANCE

### ACCELERATION:

| From zero to | seconds |
|---|---|
| 30 mph | 3.4 |
| 40 mph | 5.3 |
| 50 mph | 7.3 |
| 60 mph | 10.9 |
| 70 mph | 14.2 |
| 80 mph | 19.2 |
| Standing ¼ mile | 17.8 |
| Speed at end of quarter | 76 mph |

### SPEED RANGES IN GEARS: (5300 rpm max)

| | |
|---|---|
| I | 7-38 |
| II | 10-54 |
| III | 16-85 |
| IV | 21-top |

### SPEEDOMETER CORRECTION:

| Indicated Speed | Timed Speed |
|---|---|
| 30 | 28 |
| 40 | 39 |
| 50 | 49 |
| 60 | 60 |
| 70 | 70 |
| 80 | 80 |

## SPECIFICATIONS

### POWER UNIT:

| | |
|---|---|
| BN7 engine | Water-cooled, in-line Six |
| Valve Operation | Pushrod ohv |
| Bore & Stroke | 3.282x3.50 in (83.36x89 mm) |
| Stroke/Bore Ratio | 1.07/1 |
| Displacement | 171.7 cu in (2912 cc) |
| Compression Ratio | 9.03/1 |
| Carburetion by | Two SU H.D. 6 |
| Max. Power | 130 gross bhp @ 4750 rpm (124 net @ 4600) |
| Max. Torque | 175 lbs-ft @ 3000 rpm |

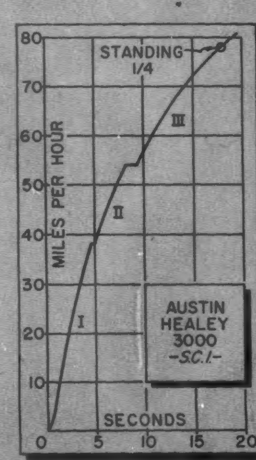
### DRIVE TRAIN:

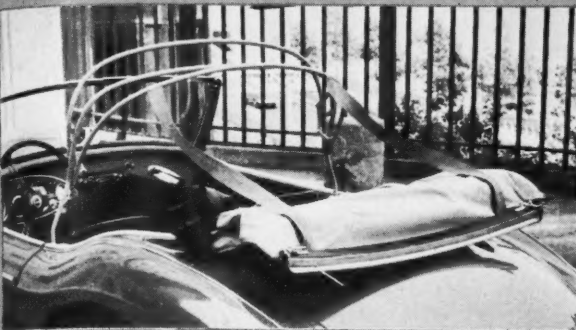
| Transmission ratios | | overall ratio |
|---|---|---|
| I | 2.93 | (10.38) |
| II | 2.05 | ( 7.27) |
| III | 1.31 | ( 4.64) |
| IV | 1.00 | ( 3.54) |
| Final drive ratio | 3.54 | ( 3.91 with 0.822 O.D.) |

Axle torque taken by leaf springs

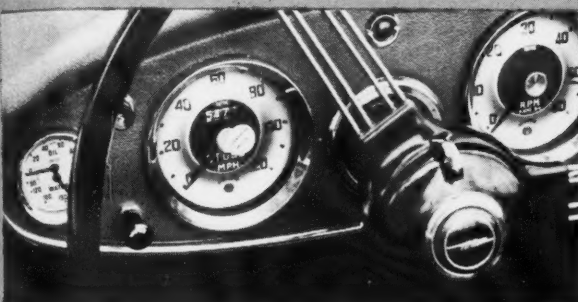
### RATING FACTORS:

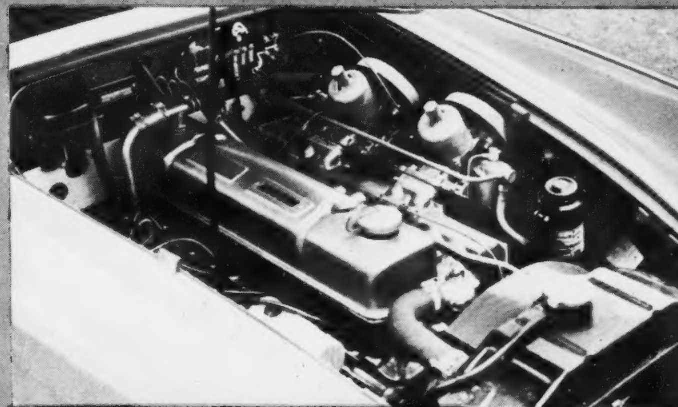
| | |
|---|---|
| Specific Power Output (net) | 0.72 bhp/cu in |
| Power to Weight Ratio (as tested) | 45.3 lbs/hp |
| Piston speed @ 60 mph | 1675 ft/min |
| Speed @ 1000 rpm in top gear | 20.9 mph |

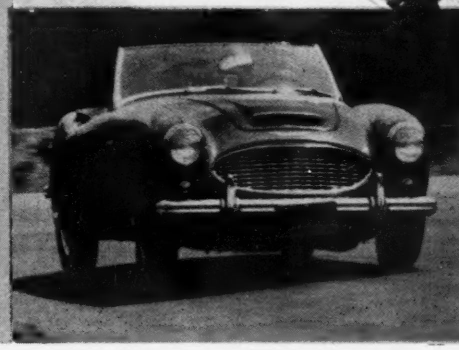




Above: Top is erected by first plugging bows into place then fastening fabric to windshield.
Below: Sticker on speedo indicates overdrive model.







Above: Engine looks exactly like previous six-cylinder but has more punch.

Left: The three liter stays flat in the corners, really storms out.

need to wind. It builds car speed through sheer *push*. This steam-enginelike torque is coupled to high enough gear ratios so that the Healey 3000 engine is loafing where others are buzzing their hearts out. An engine that doesn't need to be twisted to high rotational speeds doesn't tend to wear which may give a clue as to why there are so many early BN-1 and BN-4 units in everday use. It also shows why the Healey is one of those cars that can be race-prepared at home, driven to the track, raced and then, barring accidents, driven home again. Under normal use the damn' things just don't wear out. The bodies may rattle after a few years and a few haybales and the plastic trim may peel off in time but they keep running like the tractors their engine characteristics resemble.

To take advantage of the added power there are a host of other minor changes, some apparent and some not so noticeable. The first and most noticeable change is a switch to Girling disc (segment type) brakes on the front wheels. The back wheels retain the 11 by 2¼ inch drums. Stopping power is, though quite smooth, of the *right now* variety. Not nearly as much pedal pressure is required as with the racing-option full disc set-up nor, for that matter, as with the earlier drums. No matter how we pounded it we could not induce fade or more than a tiny fraction of pedal loss. This tiny loss could probably be traceable to lining wear in the rear drum brakes which were kept working overtime to keep up with the discs. Stops were almost as powerful as with the full Dunlop racing disc layout on the Sebring Healey.

Another change, which will probably be noticed only by those familiar with the BN-cars, is found in the gearbox. Low gear has been raised to 2.93 to 1 as opposed to 3.076 in the earlier box. Second has been *dropped* in ratio to 2.053 as opposed to 1.913 and third has been raised to 1.309, replacing the former 1.333. The effect is a bit disconcerting at first to a BN-6 driver due to the close spacing of first and second gears and the wide jump into third. We fail to see the reason for increasing this spread unless it is to produce that second gear lugging ability mentioned earlier. It's nice to have but it was also nice to be able to wind it up in second in the older versions. It's sort of a personal choice and not an easy one.

The overdrive unit, too, has been changed. It's less radical now with a 0.822 step-up instead of the 0.778 ratio used formerly. This has the favorable result that the engine can now peak in OD, formerly virtually impossible. Also the step up or down is not nearly as violent as in former models. The rear end ratio in non-OD cars is 3.545 instead of the 3.91 to 1 gears used before. The latter ratio is used in the AH 3000 when equipped with overdrive, replacing the 4.1 to 1 unit used earlier.

Another apparent change doesn't show up in the specification but can be felt. Exactly *what* was done is hard to place but the handling of the car is even better than before. Healeys are noted for their handling qualities — it takes a pretty major goof to make one come loose — but the new one has much of the feel of the competition prepared version but without the rock-hard feel of the race car. It shares with the competition car the feeling that you couldn't turn it over with a derrick. Spin it out, yes, Turn it over, no.

It is hard to truly judge the handling characteristics of the new Healey but from a few hurried laps around the course at Lime Rock Park with ordinary tires, it would seem to be a mildly final oversteering car. For a while, of course, one must turn *in* to the corner. Then for a noticeable period, long or short depending on the radius and speed of the bend, the car can be held in its drift with the wheels pointed dead ahead, steering done by throttle. Finally and fairly gently, more and more reverse lock must be applied, particularly if the corner is fairly tight. In this respect it resembles the competition BN-6 with which this writer has had some personal experience in overcooking on a corner — twice to be exact. In each case the end result was that the car went off to the inside with the tail leading the way. This fits the classic, if oversimplified, description of oversteer which holds that if the car goes through the fence nose first you're understeering; if it goes out tail first, you have oversteered.

The final piece of improvement may seem relatively minor to all but other Healey owners. This one involves the top. Personally and collectively the staff of SCI has cursed the top used on the BN-6 which takes two strong men and a very agile boy to put up. The bows were stiff and almost impervious to coaxing and the front bow almost impossible to fasten. Once fastened it became a matter of dislocating fingers and thumbs to fasten the back curtain down. The new top has removable bows that can be unfolded first and then stuck into a pair of sockets and a front bow that will attach to the windshield frame without hammering. The back of the top now fits and can be fastened reasonably easily. True, it's still not a one-handed operation and it still takes time but one man *can* do the job without breaking a finger in the process. For those who still don't want to struggle we can only suggest the hard-top. In fact we'll suggest it anyway since it's far and away the best looking and best engineered fiberglas top in the industry. Used in conjunction with the Healey aluminum rimmed side curtains it makes the car as weather tight as any roadster can possibly become — and some coupes too for that matter.

Summing up: The new Austin Healey 3000 is a comfortable car, a fast car and a very quick car. Above all it is an eminently safe car. Even more important it's a good *sports* car.

*—jpc*


# play your ace

*Formulae for winning form on AC's Bristol-powered race winner.*

*by Dennis May*

► With AC's delectable Ace Bristol, like most dual purpose sports cars, there are other ways of giving lap times a shave or improving average speed potential on the highway besides manuring the herbs under the hood. This hometruth, aired briefly in *SCI's* December 1958 issue, struck us afresh during a recent flirtation with an Ace that has probably contested more races and won more bawbees than any other AC extant.

VPL442, the car in question, is the property of Ken Rudd, managing director of K. N. Rudd (Engineers) Ltd., of Worthing, Sussex, England, who is known anyway by name to Ace fanciers all over the world. It could be that if Rudd hadn't wooed Charles Hurlock of AC and T. V. G. Selby of Bristol into a triangular lunch date back in 1954 the Ace Bristol would never have been born. On a different plane (more of this in its proper place) it was Rudd who once involuntarily demonstrated that the eupeptic Bristol engine will survive competition rigors with a mixture of oil and beer in the sump.

If you don't have a Ferrari income, any sports car you're likely to own will offer great scope for experimentation and workbench surgery; the point is, though, that some are worth it and some aren't. The Ace Bristol, with its rigid tubular chassis, well engineered independent suspension all around, and a hemispherical headed engine that is seemingly impervious to the march of the decades, is worth it.

Let's start with roadability, handling, control finesse, furniture arrangements for optimum driver convenience. The Ace, of course, is a handmade car, and one-at-a-time construction has advantages and disadvantages. Among the latter are occasional deviations from dimensional exactitude. Rear wheel camber is a case in point. On paper, the wheels have 2 deg. of negative camber with the car unladen; in practice, this angle can vary slightly, not only as between one car and another but between two wheels on the same car. An Ace with this form of built-in limp will naturally lack precise uniformity of cornering characteristics, thisaway compared with thataway. The cure is to have an exactly symmetrical replacement main leaf made up, also a new helper leaf.

The pure drift, as is well known, doesn't come naturally to the Ace but its predilection for staying on invisible rails is surmountable. To make it more driftworthy you need a whiff of oversteer, and the way to get it is to decrease negative camber of the back wheels by fitting a longer spring. Whether it's worth it or not is much a matter of individual taste. Adapted for drifting, the Ace probably won't be any faster through corners but it will feel and look faster. When Stirling Moss tried a normally rigged Ace at Goodwood circuit he was two seconds per lap slower than Rudd's best times, simply because he was instinctively trying, unsuccessfully, to tweak 'er into drifts.

For reasons that aren't too obvious, incidentally, the AC's characteristic unsliding progress pays a better dividend under night racing conditions than by day, as Rudd discovered en route to winning the three-hour sports car event at Snetterton, Norfolk, in 1957; after dark, with his Ace traveling the way it was pointed on turns his headlamps lit up the outfield markers with perfect clarity, whereas rivals on live-

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axle cars found their candlepower beamed at a virtually useless angle, obliquely towards the infield.

Pertinent to everything foregoing, and a good deal of what's to follow, is the fact that Rudd uses Michelin X tires exclusively (they are standard AC issue, of course); many of the words we're taking out of his mouth would be inapplicable to Aces shod otherwise. His considered advice, unless you are more interested in looking and feeling fast than in going fast, is to stay on X's, which are the proper complement to the phenomenal sidebite that the Ditton firm builds into its products. The pressures he recommends as a starting point for experiment — and naturally subject to considerable variations to suit different courses and degrees of surface humidity, if any — are 28 psi front and 30 rear. This assumes the car has disc brakes in front and drums at the back, a factor that affects unsprung weight (discs are heavier than drums). With drums all around, the front tires need about 2 psi less.

It's worth checking wheels for circularity. Ovality in excess of about 1/8 inch warrants a rebuild of the wheel.

As issued, the Ace's weight is distributed in the proportions of roughly 49% on the front wheels, 51% rear. For hill-climbs, if and when such modifications are permitted, Ken lightens the back end by running with a 4 gallon fuel tank, located directly over the axle. Apart from its effect on the balance of the car — you might or might not consider it beneficial — it eliminates fuel surge, which can cause momentary weakening of the mixture and consequent valve burning. A light and/or resited tank is obviously a factor with a bearing on wheel camber. Sharply negative cambered wheels are liable to hit the inside of the arches on full bump, a matter that can be rectified by switching to 15-inch wheels. But this in turn, of course, where conditions call for a drop in ratio. lowers the effective gearing, and will perhaps be a convenient way of doing so

As far as the Ace can be said to possess a vice, it takes the form of a sort of rhythmic side-chop or lurch under certain cornering conditions. This quirk, which isn't as dangerous as it possibly feels to an unaccustomed driver, can be banished by the longer back spring recipe for a modicum of oversteer. Then, with the chop eliminated, you can, if you're a really dedicated empiricst, try playing around with *front* spring spans; for some tastes, a fractionally overlength front spring is a good thing to have. Keep an eye on your spring anchorage nuts too, front and back both; if they work loose even slightly, as they may, most of your chassis tuning program will be nullified.

If and when an X-shod Ace breaks away at the back end, don't resort to panic corrections, advises Rudd; the tail won't flail as far or as fast as you think, and an overdose of compensatory lock is apt to aggravate rather than rectify a situation that is just getting interesting.

As replacements for the regular fixed-rate shocks, AC sell Armstrong sets with external adjusters. These Rudd classifies as a luxury rather than a necessity, but certainly they provide a convenient and inexpensive way of ringing changes on suspension characteristics.

The attachment of the steering box to the chassis could use some extra rigidity, distortion of the mounting bracket being appreciable when X tires are fitted. To kill the lost motion you can interpose a straight tubular strut, with suitably trapped and formed ends, between the box and the bridge carrying the front suspension system. I believe a stiffener of this type is available from AC, but it's the sort of simple item that anyone could have fabricated locally.

With front disc brakes and drums aft, grabbing of the rear pair is a fault the Ace is occasionally heir to. It occurs because the drum brakes do very little work under low pedal pressures, and they still don't do much at beefier pressures because of high back-to-front weight transference; consequently, high spots will survive on the rear linings for mileages up to maybe 10,000. These must be eradicated by lapping. Make sure, too, that the disc brakes have no shake on the front hubs.

Imposing proportions of the Ace's hand-brake lever flatter its performance, due to the fact it's mounted on the bulkhead straddling the body behind the cockpit. You can't expect mere sheet metal to resist such leverage and it doesn't, not totally anyway. The resulting lost motion doesn't matter in racing or street work, of course, but for rally tests and suchlike it's worthwhile rigging a new mounting to put the brunt on the chassis itself rather than a body component.

Every last control on VPL442 has been reworked one way or another, even including the steering wheel. In spite of having a telescopically adjusted steering column, the Ace wheel's range of movement is such that in the faraway position it denies a long-armed driver some reach he could comfortably use. Rudd accordingly lopped an inch off the top of the post . . . then found himself short on knuckle clearance relative to the edge of the cockpit. To beat *that* one he junked the standard wheel and fitted a smaller one; the increase in effective steering ratio didn't do any harm. This post-shortening mod, incidentally, involves the sacrifice of the column's adjustability.

I don't know whether Aces are still being issued with the steering wheel fitted so the spokes obscure the speedometer and tacho dials, but many of the cars in circulation have this peculiarity. The cure is obvious anyway — take the thing off and put it back properly.

All three pedals on the Ace have a superfluously long range of movement, and they don't line up ideally for heel-and-toeing the brake and throttle. On VPL442 and its predecessors *chez* Rudd, Ken shortened the accelerator travel by repositioning the pivots on the carb actuating levers, then reduced pedal throw by adding a stop; this brought the movement down from around 9-inches to between 4 and 5. Similar stops were rigged for the brake and clutch pedals, arranged so all three pads finished up in the same plane. The large overall travel of the clutch pedal was totally unnecessary because only the initial half-inch (approximately) of movement does any actual trade.

Apropos Borg and Beckware, Rudd is not an exponent of a racing clutch on Aces, except perhaps for very exceptional conditions of use. It was only recently he first installed a racing clutch on VPL442, and he considers its drawbacks outweigh its advantages. If this is so in his case, with 148 bhp to transmit, there aren't likely to be many Ace operators who'll stand to benefit from the bonus spring strength. The AC driveline is a fairly unyielding piece of mechanism (and none the worse for that, either), and virtually devoid of wind-up; so the sole outlet for inertia in violent takeoffs is through wheelspin, which in delicate operations like hillclimb standing starts is an obvious embarassment if it's excessive. Going from third to top gear at maximum revs with the throttle wide open, using the standard clutch, Rudd says he gets a momentary whiff of incendiary smell but nothing worse. If the clutch has a bad time under this punishment, it anyway recovers fast.

To conclude the catalog of amendments and addenda in the controls department, VPL442 features some extra degrees of crick in the shift stick, to bring the knob back where it'll be conveniently reachable with the seat shunted well to the rear; and a block of wood to serve as a footrest, just above the dipper switch, which the driver's foot is otherwise apt to crowd.

Standard location for the clutch and brake fluid reservoirs is just back of the rear exhaust downpipe, where local heat is intense and by no means beneficial to these important liquids. Rudd therefore resites the canisters on the firewall, somewhere around the centerline of the car. Mainly for use in rally tests, he has fitted his Ace with a hand throttle control; this is attached to one of the dash support tubes, just above the transmisison hump, and takes the form of an English type motorcycle ignition control, connecting with the carbs through a cased cable.

Additions to the dash constellation on VPL442 include a switch for the electric pump that supplements the original fuel feed system, and another switch in the dynamo field circuit. With the latter at "off" the Bristol is relieved of a generating chore that eats up 2 bhp at full power. The Ace's staple means of raising gas from the tank to the triple Solexes is a mechanical pump, feeding fuel into one end of a gallery pipe flanking the carbs; the supplementary electric pump draws fuel from the side of the tank remote from the mechanical supply, and delivers it to the opposite end of the gallery. This duplication of pumps (now, incidentally, an optional AC extra), eliminates the momentary starvation of one Solex, or maybe two, that can occur under certain conditions.

In general, the Ace doesn't suffer from excess weight, but there are at least a couple of places where the poundage can be pared, assuming this doesn't contravene regulations you'll be racing under. Rudd replaces the standard battery with a lightweight job, and usefully bants his radiator and its appurtenances. The regular rad is bigger than its duties warrant, both in surface area and thickness. His firm made one up that is superficially re-

duced and also shallower in section, enabling the mounting brackets to be lightened as well. Overall saving is of the 30% order.

And talking of cooling, he dispenses with a fan altogether in competition, without incurring any overheating penalty. Located as it is, almost laughably remote from the radiator, the fan is suspectedly ineffective above about 20 mph anyway, while it absorbs around 2 bhp at maximum power.

Unless AC have had a change of heart in very recent times, Aces are still being issued with their header tank filler caps drilled to defeat the system's intended 4 psi of pressurisation. You can put those 4 psi to a good use in long races, so the thing to do is throw the perforated cap away and drop in at your local BMC dealer for a Morris replacement. It's exactly the same, only it doesn't have the unwanted hole.

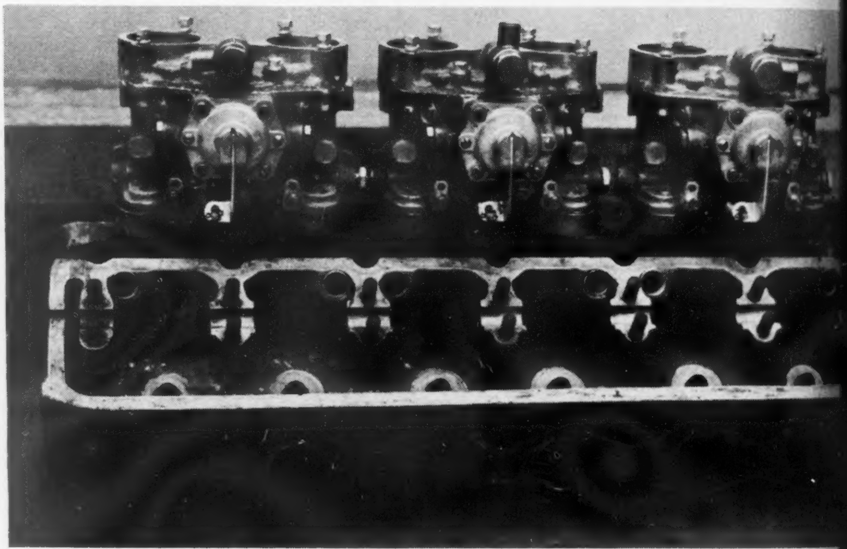
The radiator cowl that AC currently include among their optional extras for competition was originally a Rudd invention. He developed it in pre-Bristol days, found it was worth 4 mph in conjunction with AC's immemorial single-ohc engine. It gives the Ace Bristol more than that.

Undershielding an Ace to cut drag is a three-stage operation. Very good results are gotten without going any further than stage one, which consists of cowling in the bottom of the car from the underside of the air intake mouth to the front cross member. The next stage shuts in the nether area from this cross member to the front of the sump. Finally, if you take your racing really seriously, you can add a last sheet of alloy to enclose the space from the back of the engine (leaving the underbelly of the engine itself exposed) to the fuel tank.

With either one of these stages of shielding, an oil cooler is indispensible; even without any of them, nobody in his sense races a Bristol, or indeed operates it anywhere in its more advanced states of tune, without this somewhat expensive item of equipment.

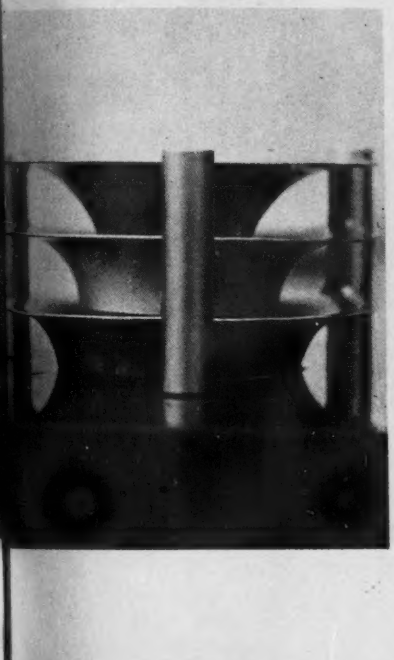
Rudd naturally had an oil cooler on his Ace when taking part in the British ranking event for the European rally championship last year. At an advanced stage of the rally, when he was on the point of retiring for the purely personal reason that he'd contracted pneumonia, he and his co-driver noticed their oil pressure was dickering between 2 and 5 psi. Investigation revealed that the sump was not merely full but overflowing with a light, frothy and altogether evil looking swill. It was calcuable that over 100 miles of rigorous motoring had elapsed since any hypothetical saboteur could have had privy access to the car. Later, when Ken was rid of his pneumonia, he had the stuff analysed. It consisted primarily of motor oil and beer, plus the Bardahl lacing his engines always get. It isn't every engine, even with the aid of Bardahl and an oil cooler, that will keep right on functioning with a high percentage of Whitbread's pale ale in the pan.

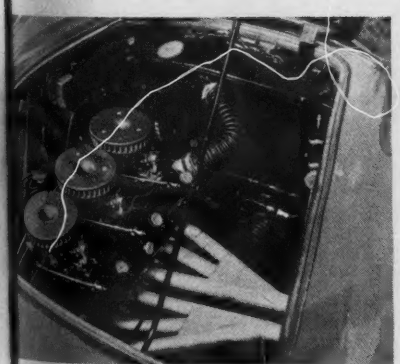
If you're thinking of sculpting a scoop in an Ace Bristol's hood to get cold air to the carbs, think twice. Experiments in



Experimental six-port Bristol head (above) developed by Ken Rudd. New top hamper accommodates three triple choke Solex carburetors. It has not been completely de-bugged, and at present cost prevents production.

Vocal Le Mans exhaust system (far left) as fitted to Rudd's Ace Bristol has outlet ahead of the back wheel. Gear shift lever (left) is bent to bring it closer to wheel rim when in third gear. Rudd-type carb air straighteners (below) add about 4 bhp at top end.





Aces with Bristol (above) power have been fairly successful in US racing. With super tuning, ala Rudd's VPL442, they become even more of a threat.

Englishman Ken Rudd (left), whose Ace has very seldom been trumped, swigs victory drink at end of Snetterton 3-hour race.

this vein were tried on the 1957 Le Mans car, but rather puzzingly led to the conclusion that the thing preferred warm air. During Goodwood tests, those responsible for the car's development alternately blanked and unblanked the forward facing scoop without telling the test drivers what they'd done; repeatedly, lap times were faster with the scoop shuttered off. Admittedly, however, the two new type ACs that ran at Le Mans last year featured scoops in their hood tops, and presumably these were open.

Talking of Le Mans reminds us, with a certain irrelevancy to our main theme, of the piquant circumstances in which the Bolton/Stoop AC raced into eighth place overall in last year's prix of endurance — a story hitherto untold. Somewhere around the seventh hour the on-duty driver pitted and reported the car felt sort of flaccid, almost as though it was being held together by its shock absorbers. The pit manager lifted up the stern lid, peeked within, winced, slammed it down again and whispered hurried confidences to the driver. The shocks were indeed holding the chassis together, with a slight assist from the tail-lamp wires. The frame had broken in three places.

Given leave to proceed — for awhile anyway — as long as he drove with extreme sloth and caution, Bolton complied by lapping at 85 and keeping right on doing so. To agonised pit men signifying take it easy, he responded with ribaldly defiant gestures. The fractures, incidentally, had carried away the pipelines to the back brakes, but with twin master cylinders in the system this bereavement could be borne. The AC's race average was 89.5 mph.

Sequel to the adventure came the day after the race, five miles out from Le Mans en route for England and home. While pootling gently along at sightseeing speed, the AC just collapsed, subsiding onto its belly in the road. Later again, in the TT, it was to break its frame for the second time, a fact that the retinue had the presence of mind to obscure by disconnecting a water hose at the pit and giving it out their retirement was due to overheating trouble. (If you own an Ace, or are thinking of owning one, don't take these revelations too much to heart. The Le Mans ACs had space frames of a new design, altogether unlike the regular Ace).

This isn't the place, even if we had the space, for an exhaustive treatise on wringing more power from Bristol engines as supplied for the Ace; but an item or two of Ruddlore can perhaps be crammed into the few column inches we haven't used up yet.

Assuming you're starting out with a 100DI engine and wish to hoist the compression ratio from the standard 8/1 rating to 10/1, there are at least two ways of doing it. One is to fit 9½/1 pistons and machine 30 thousandths off the head. Alternatively, and this has certain advantages apart from the cost factor, you can retain the 8½ pistons and machine off 90 thousandths

VPL442's engine develops 147 bhp; or, more realistically, it develops something different almost every time it goes on the brake: at sea level and on its best behaviour it turns 147 horsepower, and in proper shape it never drops below 140. But you won't get performance of this order merely by raising the compression to 10/1 and putting everything together nicely. The Rudd engine, for instance, departs considerably from stock in the carburetion department. The triple Solexes are fitted with air straighteners, have their chokes bored from 28 to 30 mm. (bringing them down to wafer thickness, incidentally), and use 145 main jets in combination with 210 air compensating jets. In Solex experiments the amateur is best advised to play around with air compensating jets rather than mains, the former being much easier to change.

Air straighteners, which Rudd's company is exclusively authorised to make and market, working from Bristol drawings, are worth about 4 bhp at the top end and absolutely nothing low down. The current type has three elements. The earlier model with only two elements is approximately half as effective. If you're thinking of counterfeiting a set of homebrew air straighteners, by the way, get every dimension right to a hair's thickness; they're highly critical dimensionally, and if they aren't spot-on correct you are better off without them. These straighteners, with the vital elements encased in a standard top and bottom member from an ordinary air cleaner, are deceptively simple looking devices. Being taller than the old two-ring pattern, the three-ring model is a tight fit under an Ace's hood. Under-hood clearance varies slightly from car to car, and those with lesser clearance need a bulge built in to accommodate a set of late type straighteners.

In streamlining Solex butterflies you can aim at a lot or just a little. The basic step, of course, is to fine down the two semi-circular lands of the flaps themselves, relieving these areas on opposite faces to maintain a proper air seal. Then you can go to work on the protruding heads and tails of the screws fixing the flap to the pivot; with the screw ends cut back flush with the surrounding metal and the heads carefully flared, you should be able to count on 4 bonus bhp.

Next, the butterfly lands can be built up with solder to merge them into the pivot strips. And finally, if you're prepared to risk having a butterfly cast its moorings on full power, you can dispense with the pivot strip on the side remote from the screw heads, shortening the screws appropriately and securing them by punching.

Turning to the engine itself, all inlet tracts should be smoothed and matched to their carb stubs in the usual way; but it's important to realise the section surrounding the tracts isn't meaty enough to allow actual reshaping or enlargement. Carbs are not interchangeable and should always be mated with their original cylinders after disassembly.

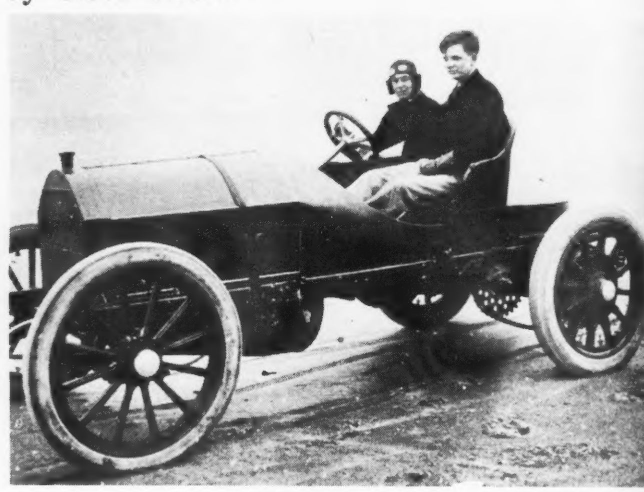
On putting an engine up when the head has been off, make frequent valve clearance checks. Clearances may need resetting three or four times before the engine really settles down. And relap the head to the block every time the head is lifted.

The Le Mans type exhaust system is a

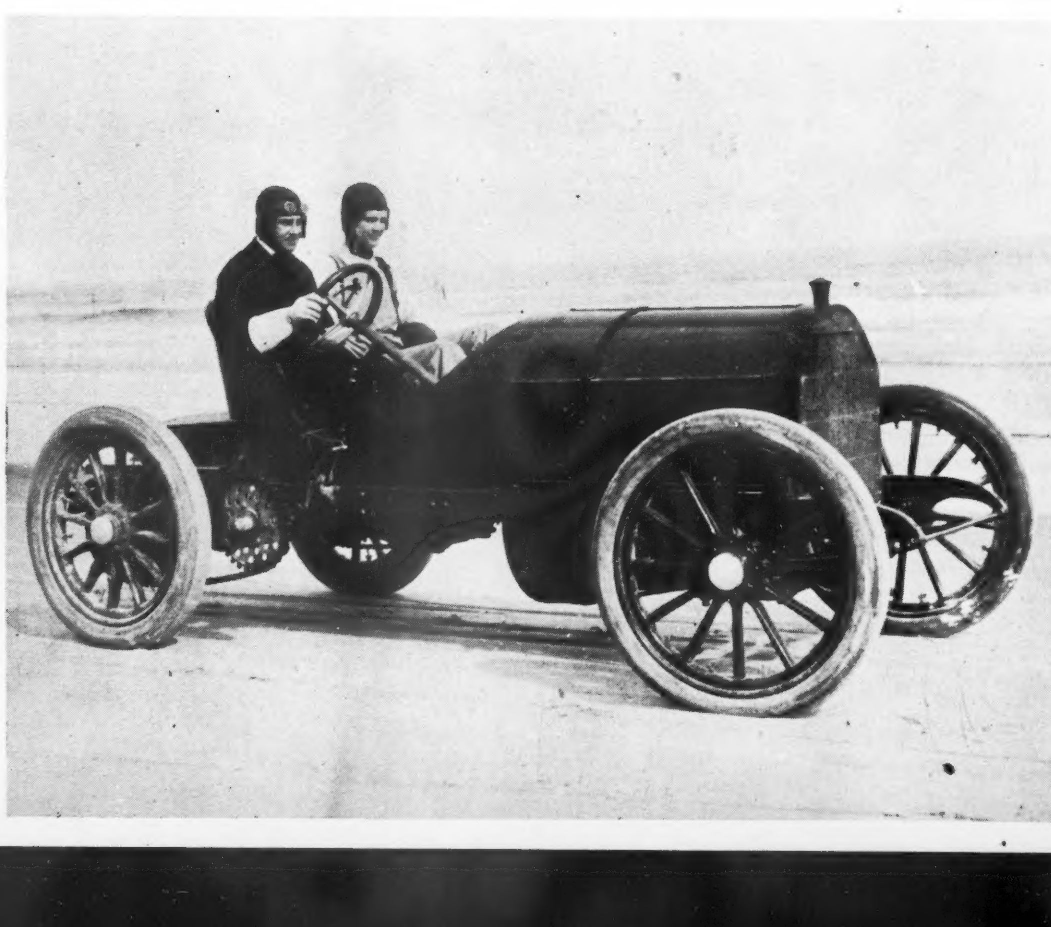
*(Continued on page 95)*

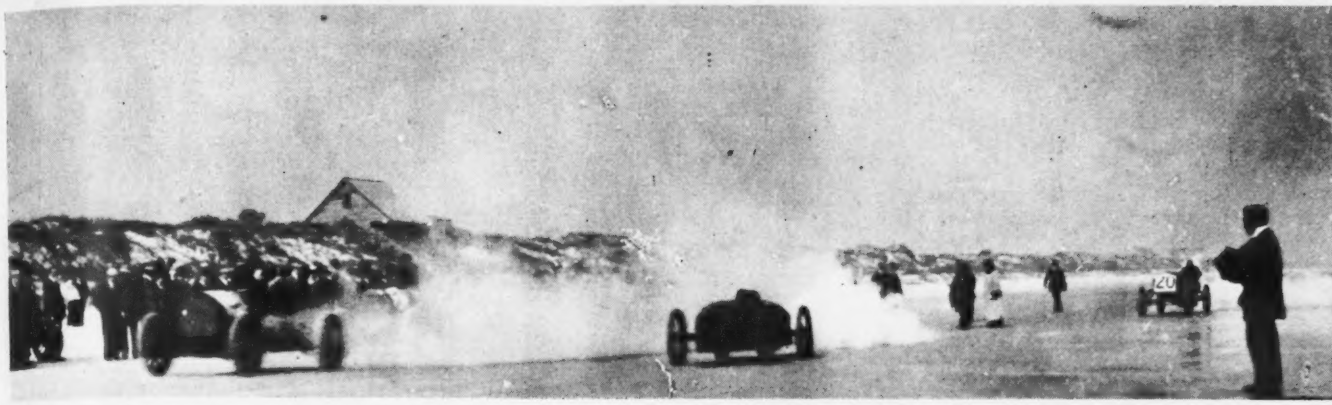
# WHEN (steam) WAS BEATEN

*by Cleve Poole*



Above: This picture, taken in 1901, shows Ned Blakely, in the white sweater, at the tiller of an electric runabout. Right: Six years later he sat behind the wheel of the American Mercedes at Ormond Beach prior to the race. Below: Ned at the wheel, unidentified friend has donned helmet.





The start of the ten mile race. Mercedes, left, leaped ahead of the steamer in a standing start. The steamer re-passed, but was beaten at the finish.

There is a legend that no man would dare to hold the throttle of a steam car wide open, or if he did they would give him a car free or a brand new set of wings. There is the further idea that if only the Stanley brothers had advertised we would now all be driving steamers. Such stories are part of the romantic legend which has grown up around the old-time steam cars. The truth is that for short distances and for hill climbing contests the early steam cars could out perform the early gasoline cars. The gasoline car won out because of its superior reliability and greater simplicity of operation as far as the driver was concerned. Gasoline had more parts but less tinkering. Steamers were too temperamental.

One man and one car dominated the speed carnival at Ormond-Daytona Beach in January 1907. Together they left the Stanley Steamers standing in the shade. The car was the American Mercedes and the man was Edward B. (Ned) Blakely, now living in Darien, Connecticut, 81 years old, and still an automobile enthusiast.

In 1907 Ned was no amateur. He had built his first racer, an electric runabout, and raced it at Aquidneck Park, Newport, Rhode Island, on September 16, 1901, where he won the race for electrics. After graduating from Harvard in 1902, only a career with motor cars could satisfy Ned, who, in 1906 went to work for the American Mercedes Company in charge of testing.

American Mercedes decided to enter one of their regular stock cars, a gentleman's runabout, in the Daytona Beach races to be held late in January 1907. The big race on the program was the One Hundred Mile Race for the Minneapolis International World's Championship Trophy. The weather was ideal, not a cloud in the sky, while a nice easterly breeze added comfort to the occasion and sharpened appetites for luncheon.The event was to be run on a fifteen mile course with 7½ miles on each side with, of course, a sharp turn at each end. The sand at Daytona is hard and firm, nearly as hard as concrete, but you cannot skid a car on the turns. To attempt a sharp turn at speed is to court inevitable disaster. Thus, the cars had to slow way down in making the turns at each end of the course. The club house, in the middle of the course, was the place where the race started and finished, which added up to 13 sharp turns in 100 miles of racing.

Ned Blakely in the 70 horse power American Mercedes competed against A. L. Kull, 35 hp Wayne; Capt. C. E. Hutton, 20 hp Rolls-Royce; L. H. Pelman, 50 hp Welch, and Ralph Owen in the 35 hp Oldsmobile. It is easy to see that Ned was the favorite. In the first 25 miles he gained nearly five miles on Hutton, his nearest competitor. At the half way mark he was 10 miles out in front and later lapped all the others, finishing the 100 mile race in 1 hour, 26 minutes and 10 seconds, for an average speed of approximately 69½ miles per hour. All this in a car built for every day street use, a car advertised to climb hills and able to go four miles per hour in high speed, a gentleman's runabout. The factory proudly proclaimed in a New York advertisement the day after the race — "This is our regular touring car stock engine, the one you get when you *Buy* our car — Made from the 1907 blue prints and steel of our parent factory. The German Mercedes and the American Mercedes are absolutely identical in everything; the parts of one fit the other. Get this confirmed at our factory in Long Island City and 1777 Broadway, New York City, not through competitors."

The next event on the card was the 10 mile race from a standing start. In this event Ned was up against some really tough competition in the form of Stanley steamers and the course was a 10-mile straight laid out on the beach. Old F. E. Stanley was mounted on a 30 hp Stanley Steamer while Fred Marriott was driving the big "cigar", their special steam racing car.

Ned had been a Stanley dealer in Newport, Rhode Island, and knew what the steam boys were up to. He was aware that they were running their boilers at 1200 lbs. steam pressure and he figured that if he could scare them into pushing their cars too hard, well, something just might give and win the race for him.

Here's how Ned tells it. "I revved the Mercedes way up and when the starting signal came I jumped ahead about fifteen feet." The steam boys couldn't take it. Fred Marriott poured on the steam and within a half mile he blew out a cylinder head with such force as to demolish the rear point of the light frame and disable the engine beyond immediate repair. F. E. Stanley's machine held together and Ned said, "He passed me like I was standing still." *But,* as Ned was tearing down the beach at better than 90 miles per hour he "saw the steamer coming towards me", so fast was he catching up on it. At nine miles Ned passed the Stanley and came home the winner in 7 minutes 42¼ seconds (approximately 78 m.p.h.). The Stanley coasted in 10 seconds later.

What happened to F. E. Stanley? He broke a rocker arm on his water pump. It couldn't pump against the very high boiler pressure and hold together. By such breaks are races won and lost, and as Ned said, "I figured that the spring clutch on the Mercedes would not break on my jump start and I might get the Stanley boys to make a mistake".

F. E. Stanley coasted over the line in second place and the problem was how to tow the car back up the beach. Ned had wound his springs with steel cables to keep the car from bounding if he should hit a stretch of rough sand. He removed these sections of steel cable and towed F. E. Stanley's disabled steamer back to the starting line. The 50 hp Welch was third and the 10 mile race was history.

All in all, the American Mercedes won four races at the speed carnival and Ned Blakely was easily the star of the week. It had been expected that the Stanley Steamers would be the hit of the program, but one clever young driver in an American Mercedes put them out of business in the ten mile event from a standing start on a beach that was perfect with a strong wind blowing straight down the course.

*After twelve exciting years the "Temporada" in Buenos Aires runs into a financial brick wall.*

*by Vicente Alvarez*

**part 1**

1. Historic moment—Fangio wins his first GP race.
2. Pre-war ace Manfred von Brauchitsch practices for the 1950 race. He withdrew before start, however.
3. Ever the stylist, Dr. Giuseppe Farina tools the winning 3-liter Maserati around a corner during the 1948 Mar Del Plata Grand Prix.
4. Collection of pre-war cars stream away from the start of the 1947 Buenos Aires GP race.
5. Back in the days when cars were big and men were strong Achille Varzi was a name to reckon with. Here, he waits on the grid in a blow 3-lit Alfaer Corsa.
6. Luigi "Gigi" Villoresi was always a showman, and the blown 1,500 cc Maserati was a perfect prop. His performance in the 1947 Buenos Aires Grand Prix was remembered for many years.

# ARGENTINA GRAND PRIX RACING

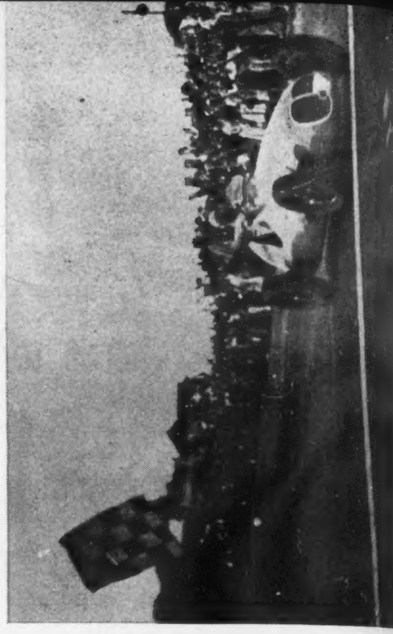
► The checkered flag fell as Juan Manuel Fangio crossed the line — a winner of the 1958 Grand Prix of Buenos Aires. The small crowd that braved a torrential rain to be at the Autodrome started on their way back home. Another Temporada had come to its end. It had not been a particularly exciting one. They were leaving the grandstands thinking of the full year's intermission ahead and hoping to watch some terrific racing in 1959.

In the officials' stand, however, feelings were completely different: this race could probably mean the end of all International racing in Argentina. As rumors became official news, auto racing suffered a hard blow. No International races were to be staged in 1959!

This announcement by the Racing Office of the Argentine Automobile Club put an end to a brilliant cycle of Grandes Epreuves which started after World War II and garnered the title of "The Grand Prix Capital of America" for Argentina. Buenos Aires was the stage for the opening round of the World's Drivers' Championship and the Championship of the Marques, gathering year after year the very best of Europe's driving talent and the latest in racing machinery. Great credit must be given to the men in the Automobile Club for their efforts: from a program of non-formula, non-championship races, they developed a racing institution that made the Spanish word "temporada" a synonym of first-class racing all over the world. They treated Argentine enthusiasts to the best of Grand Prix events, and sponsored the participation of local drivers in European competition. The "Temporada" marked the entry of a group of local pilots in the upper echelon — notably Fangio and Gonzalez.

Unfortunately, Argentina's stable economic condition of the early forties deteriorated tumultuously through the last ten years. Internal inflation and depreciation of currency in the International market made buying imported goods or imported entertainment a prohibitive operation. Staging the "Temporada" soon became a money-losing project. With the current peso-to-dollar exchange rate, the time came when the Club could no longer afford it.

The average enthusiast who still believes in love for the sport of speed and a few other high-sounding cliches, would be puzzled if he ran his finger down the itemized budget of a race season. He would find that laurels are never mentioned, but even the slightest change in any part of the operation that might cost money is mentioned — usually in red ink. He would dis-



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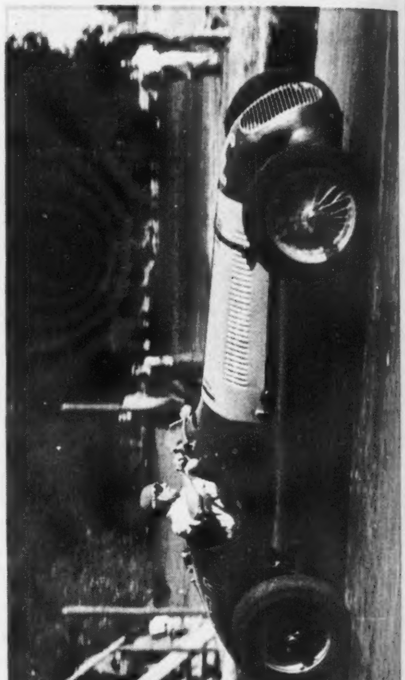

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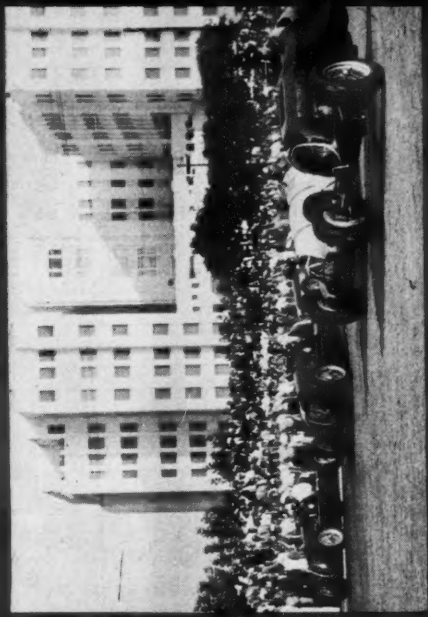
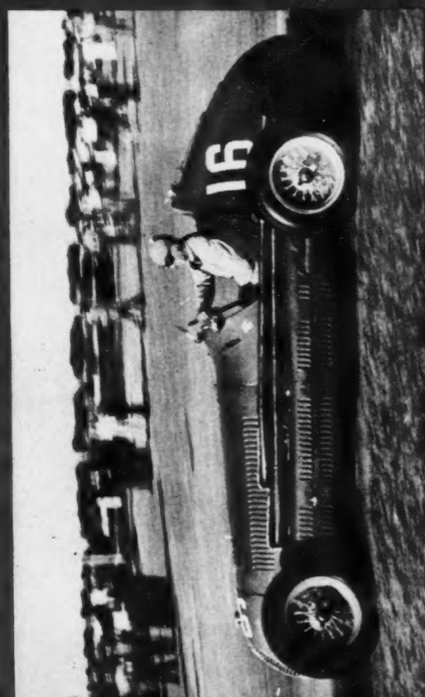
cover how large a sum of non-publicized money has to be spent to secure the services of drivers and cars — not only those of "prima donna" caliber, but the also-rans as well. Transportation of men and machines, insurance, hotel bills, starting-money, taxes, air-express postage for urgently-needed parts, phone calls and wires to Europe and a hundred and one unforseen expenses, have to be reckoned with, not to mention expenses due to the whims and fits of some "temperamental" visitors. European teams that have come over recently have earned quite a reputation as sharp businessmen. They write all of their invoices in dollars which, at the current exchange-rate, amounts to millions of pesos. Revenue from the last "Temporada" was a mere 35% of the total expenditures. The government came to the rescue and footed the bill, but won't do it again, which is perfectly understandable.

Adverse factors notwithstanding, the Automobile Club gave thought to another try in 1959, in the hope of lining up a first-class field which might draw a record-crowd. Vanwall, Maserati, B.R.M. and Gordini could not make it. Fangio's retirement and the lack of local pilots active in the Formula One championship would certainly tell on ticket sales. The only wise thing to do was to abandon all plans for any Grand Prix racing in 1959. We all hope that things may change in a year and the Temporada will be revived.

World War II interrupted a very active racing schedule in Argentina (surprisingly active for a country which at that time had no auto industry of her own) at a moment when several "circuit routier" and "round the houses" road courses were in full operation and local workshops were producing a large number of cars specifically designed for Grand Prix type racing. The last big event before the ban on racing was issued was the Grand Prix of Buenos Aires, run on November 1941 on the Retiro "circuit", 1½-mile course located within a stone's-throw of downtown Buenos Aires. It was not a particularly exciting course, but transportation-wise, it was perfect. Three top-ranking drivers from Brazil gave this race an appealing tone of international color. Buenos Aires had not seen a Grand Prix for five years: a record crowd gave evidence of the public interest. The field consisted of the best machines available in the "National Mechanics" category (race-chassis with hopped-up stock engines) topped by the largest number of "specials" ever gathered for a single race, namely Alfa Romeos and Maseratis. This race was a great success and the promise of more to come was happily relished by the enthusiasts. At long last, the Grand Prix of Buenos Aires seemed most likely to become an annual affair. However, five years would pass before they could taste it again, in 1947.

1947. At the end of the war, the racing fraternity began to grow restless — and plans to resume racing were made. Drivers and cars were ready for another Grand Prix of Buenos Aires early in 1946, but the green light from the authorities still had to be secured. The boys started training. Every Sunday they met on the Retiro course at the crack of dawn. They carried on practice through the entire year, although no one could tell what for, until the announcement was made in the fall of 1946 that the Grand Prix was, definitely,





going to be run early in 1947, as the opening date of a four-race program. The Racing Office of the Automobile Club had been working quietly and stubbornly on a project of the it-couldn't-be-done variety, and eventually Chairman Francisco Borgonovo announced that a full team of Grand Prix stars had been signed up in Europe — Varzi, Villoresi, Pintacuda, Palmieri, Plate and Raph. Races would be run on a Formula Libre basis, semi-stocks being eligible to compete. Great interest was centered upon the appearance of the 4CL type Maserati — the belle of the program — the car to beat on winding courses. Villoresi made a great impression on the public and soon became a favorite. Less spectacular (and less of an extrovert as well, in or out of the car) his team-mate Varzi did not catch the eye of the masses, but stop-watches told of his excellent driving. Villoresi won the two races at Buenos Aires — Varzi scored on the twisty Rosario City course. The fourth race of the program was cancelled. Among the local drivers was a man named Juan Manuel Fangio whose early record as a road-course driver had been comparatively unimportant and decidedly overshadowed by his fabulous exploits on stock cars in point-to-point highway races. He did not drive a "special" in the first Temporada but a home-built Chevrolet-engined job; however, his brief reappearance into his original activity — road racing — focused attention on his potential Grand Prix talent. His performance among the domestic hopped-up curtain-raisers was highly praised by the European drivers. Little did they know that this home town boy would soon be undisputed master of any Grand Prix course.

Record crowds were at hand for each of the three races. The Automobile Club proudly announced a bigger program for 1948: more big name European pilots; more and better cars for local drivers still to be nominated. It was an open secret that Fangio was at the top of the list. The Temporada started on its way up.

1948. A new location was chosen in Buenos Aires for the 1948 races: a 4,865 meter course in the beautiful Palermo Park. Spectators made themselves comfortable in the shade of huge old trees surrounding the course. The track itself was more intricate and appealing than the plain Retiro triangle. 1948 races were run under "Formula Libre" but only special cars were eligible. The "Buenos Aires Champion" Gigi Villoresi was again on hand; Achille Varzi drove a big 4.5 Alfa; the Scuderia Milano had three cars: a 32-valve three-liter Maserati (Seventh at Indianapolis with Villoresi in 1946) to be driven by Giuseppe Farina and two dual-stage blown 1500 Maseratis for Enrico Plate and Aldo Ruggieri. Jean Pierre Wimille was listed to drive a three-liter Alfa and a 1.3 Simca; Fangio had two "specials" this time: a 4CL Maserati and a Simca.

Villoresi lived up to his unofficial title by winning both races at Buenos Aires and setting the lap record for the new course at 2:33.7. Fangio could not get the Maserati or the Simca going well at Buenos Aires, but made headlines in spite of being an also-ran at Rosario. After a battle royal with Fangio at Rosario, Wimille won. Both were on Simcas, and the little cars proved perfectly suited for the twisty, slow course.

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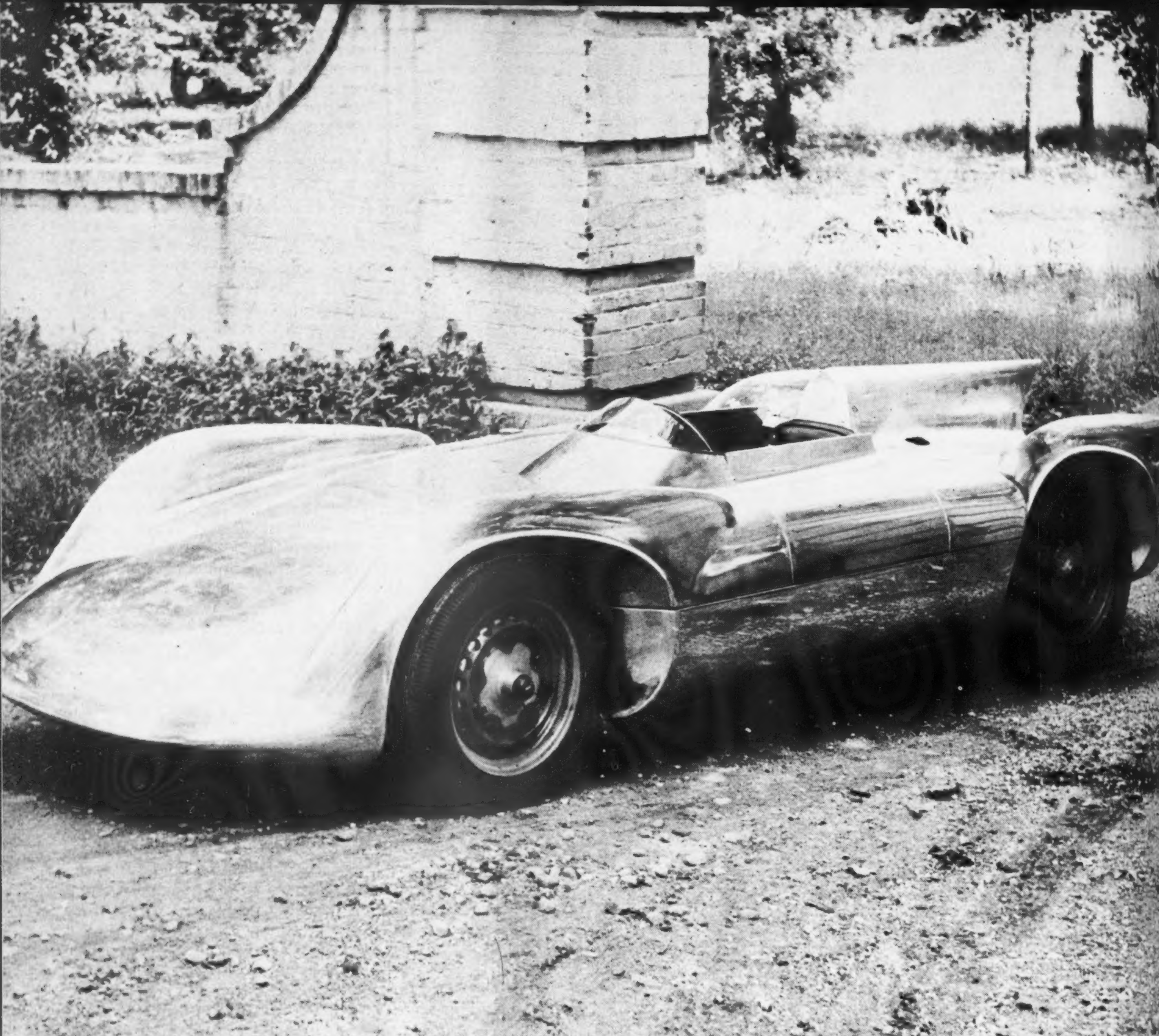


The Webb Durlite Spyder (above) took full advantage of owner's professional body-building experience. Stuttgart would not be ashamed of the final results.

# RAISING SPIDERS AT HOME

*by George Moore*

► Money may be the root of all evil, but it buys good race cars.

There is no sport in the world more fascinating or more expensive than automobile racing. And the individual who enters into the game without a goodly supply of the long green can qualify as the counterpart to the mule who kept bashing his head against a brick wall. They just don't get ahead.

Fortunately, there are still a few rugged individualists who are undaunted by short financing, and who are not frozen with fear over the prospects of someone lining up next to them with the latest piece of equipment imported from Europe. These speed-minded parties generally have a fair amount of horse trading sense, a great deal of ingenuity, a touch for the welding torch, and no inhibitions about hard work. As far as the possessors of such sterling qualities are concerned, it still is possible to come up with an automobile containing the necessary ingredients to saw the legs off a machine from a factory with the benefit of top-drawer engineering talent and the drawbacks of a cost-accounting department.

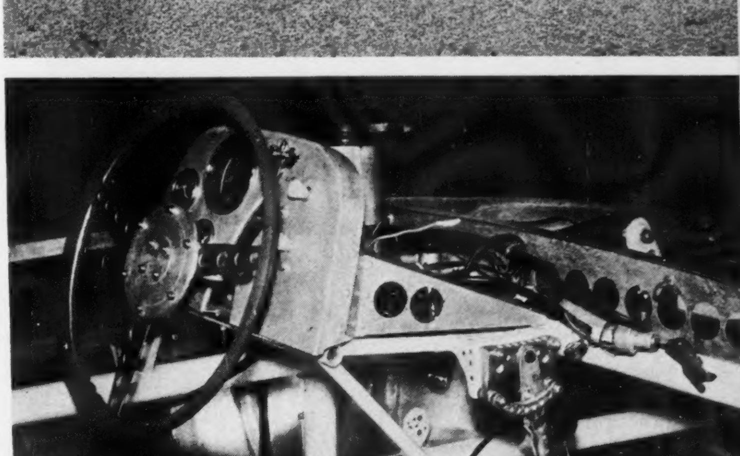
There seemingly is a tendency to tag hand-built personal dream cars with the none-too-complimentary handle of "back yard bombs," a reference which would infer that much is left to be desired in the way of workmanship or potential performance. This is not necessarily true, and certainly cannot be construed in the case concerning the Indianapolis-built special called the Webb Durlite Spyder. The brain child of its creator, an Indianapolis body builder named Bob Webb, the car is a classic example of what can be done when a limited budget is parlayed with a bit of honest sweat and a lot of "know-how."

First consideration of this automobile gives the impression that it was patterned after the Porsche 550, but actually the ideas had been kicking around the builder's head for many years. They were first put on the drawing board as far back as 1954. Many of the innovations jotted down in those days later appeared on the factory Porsche machines, which have dominated the 1500 cc class in sports car racing.

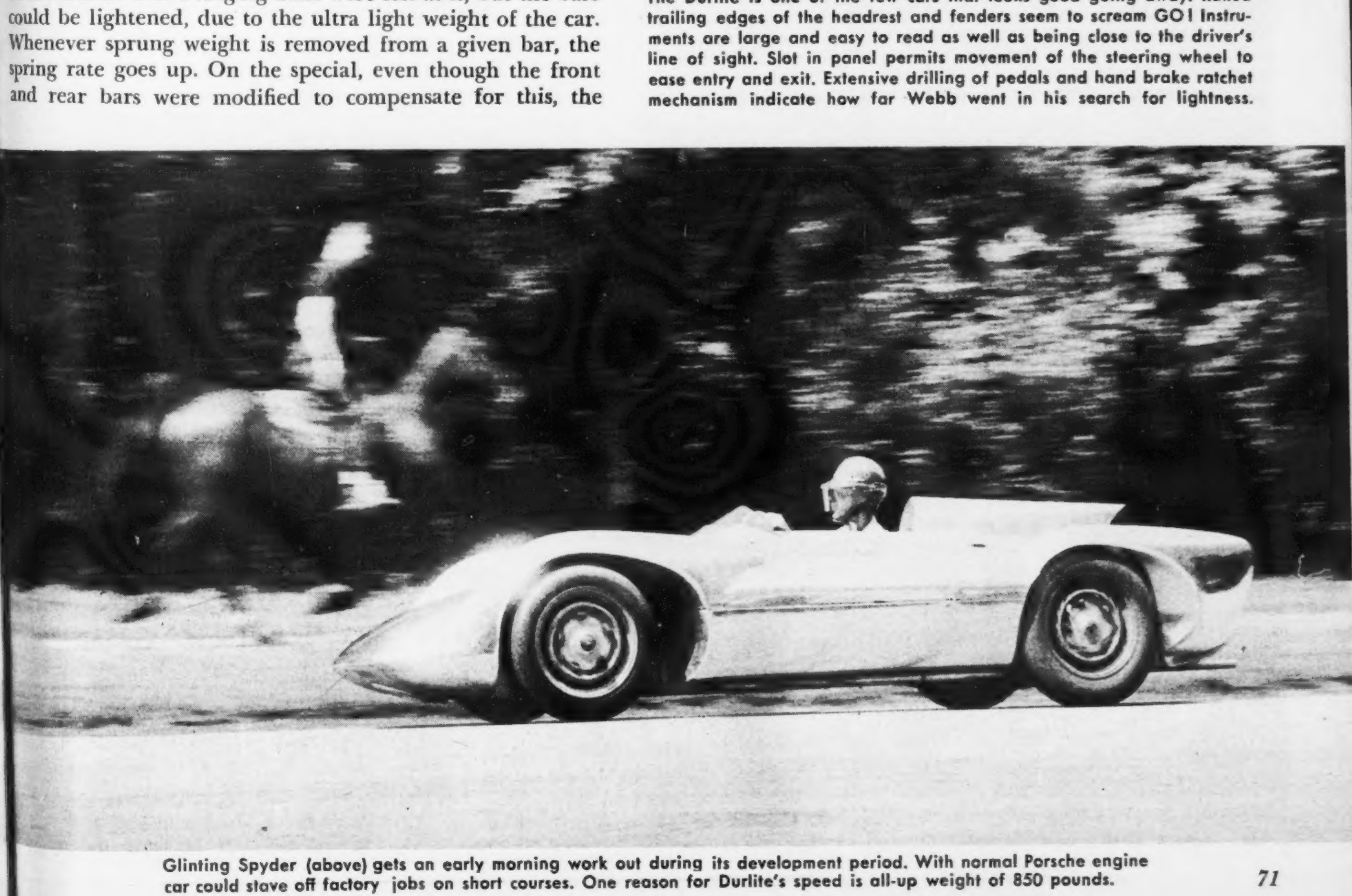
Constructors of racing cars generally begin by fabricating a frame, and then spread outwards in all directions to eventually work their way towards a completely finished product. Webb did not attempt to depart from this formula, for his first move was to obtain two-inch 4130 chrome moly tubing of .059 wall thickness, and lay it over a simple jig. The frame is deep-truss type, employing four main tubes and five cross members. The same two-inch diameter was used for all members, holding the weight to 52 pounds.

So far, so good on a cost basis; but now the project was at the point where running gear had to be acquired. Not wishing to originate these supporting pieces, negotiations were opened with a local Croesus in the wrecking yard business to acquire standard Porsche type front and rear suspension units.

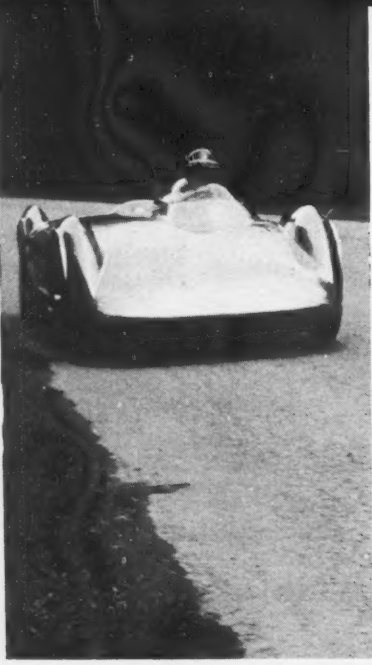
The forward assembly was mounted so the parallel torsion bar housings constituted the two front cross members of the frame. The swinging arms were left as is, but the bars could be lightened, due to the ultra light weight of the car. Whenever sprung weight is removed from a given bar, the spring rate goes up. On the special, even though the front and rear bars were modified to compensate for this, the



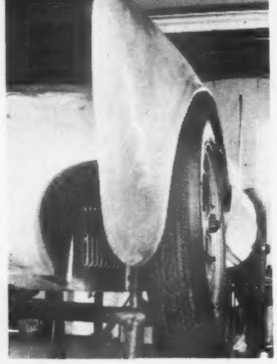
The Durlite is one of the few cars that looks good going away. Raked trailing edges of the headrest and fenders seem to scream GO! Instruments are large and easy to read as well as being close to the driver's line of sight. Slot in panel permits movement of the steering wheel to ease entry and exit. Extensive drilling of pedals and hand brake ratchet mechanism indicate how far Webb went in his search for lightness.

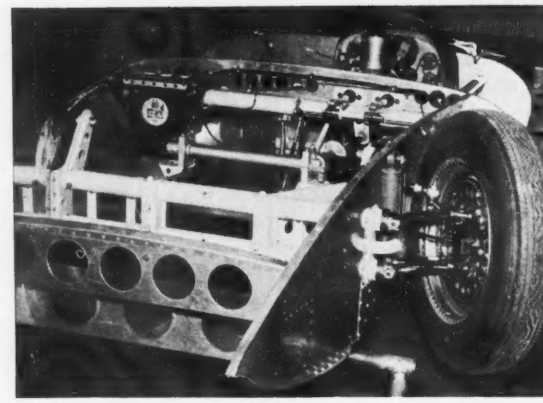


Glinting Spyder (above) gets an early morning work out during its development period. With normal Porsche engine car could stave off factory jobs on short courses. One reason for Durlite's speed is all-up weight of 850 pounds.

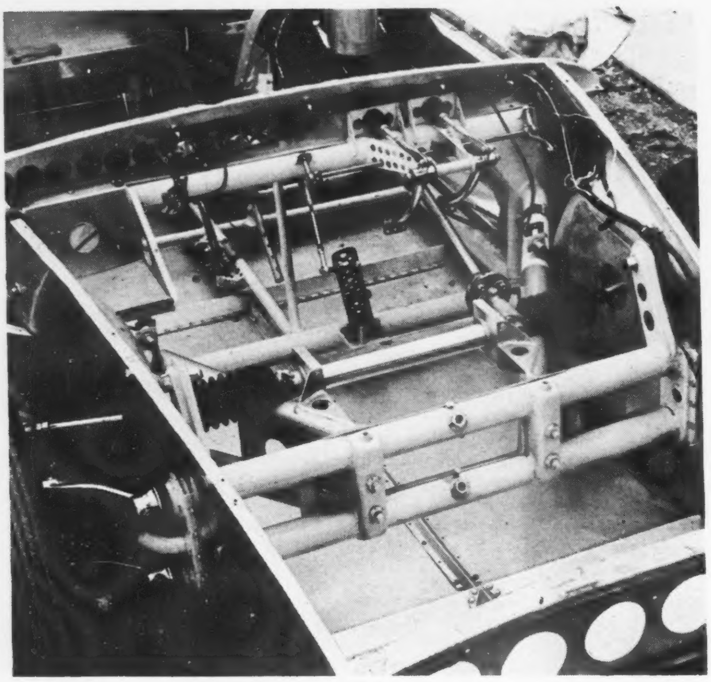


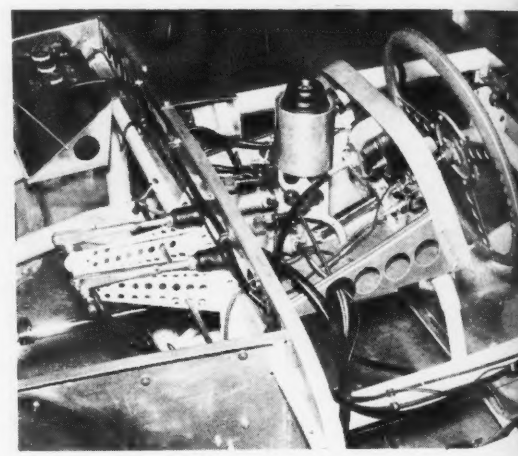
Yes, the Durlite (left) is streamlined. Vented tunnel (below) pulls hot air out of engine compartment. It also induces flow past brake drums.





Brake backing plate has been extensively drilled to reduce unsprung weight. Stock steel wheel has also received the same treatment. Polished trailing arms, and transverse tubes carrying torsion bars are all Porsche parts.





Steering shaft (above) is led through two universal joints, and is held in place by simple locking device.
Canister behind instrument panel holds hydraulic fluid for the brake system.
Basic punt structure (left) is tied together by the torsion bar housings.

rate still was higher than the stock version. However, 50-50 Monroe shocks handle the problem in good fashion, eliminating any tendency for the machine to hop, skip or jump on a rough or rolling road.

Just as important in getting a race car to go is to get it to whoa. This is accomplished via 11-inch brakes from a competition Porsche, a set up which provides restraining tendencies comparable to anchoring the little beauty to a large tree. A single master cylinder actuates two leading shoes in front, and a single leading shoe in the rear. Backing plates are ventilated.

For the boys with the well padded check books, the next step is to go out and buy a set of magnesium wheels. For those on the opposite end of the scale, it is time to pick up an electric drill and start punching away. By boring out in all unstressed areas, it has been possible to obtain a suitable drilled steel wheel. Possibly there is room for debate as to whether a "mag" wheel would do a better job in reducing the unsprung weight, but to date the lightened 15-incher has commendably remained in contact with the ground.

Ingenuity again raised its head when the operation got around to the steering gear: rack and pinion was the answer. The only question was whose? Financial considerations dictated the selection of a production unit, so a Morris Minor gear was chosen, and modified by shortening the length of the rack and housing. This achieved a truer steering geometry with trailing arm suspension.

With a close quarters envelope body, space was at a premium. Webb hurdled the cockpit access problem by using a single U-joint that permits the wheel to swing in an arc, raising it six inches and moving it two inches to one side. A simple locking mechanism fixes the steering column in its bottom position. The wheel itself is of drilled aluminum alloy, and a molded cork rim gives a more resilient grip.

When the *aficionados* of race car building gather, nothing raises the hackles on the back of their necks more than to enter into a spirited discussion on the merits of various suspension designs. The Durlite special will contribute to controversy, because at present no sway bar is used and the car has been successful in competition. An experimental bar is coming, after some of the details of its unique hookup are worked out.

This particular bar is projected for the front end, and will work in conjunction with a double-acting hydraulic

*(Continued on page 80)*

## *Built To Win . . .*

*(Continued from page 25)*

the combustion chamber could not be very much smaller than that in the V12. It made sense to Mercedes then and it has to engine designers ever since.

The M165's cylinders are deep forgings of chrome steel, flanges at their bases being welded together to form two blocks of four cylinders. In accord with long-standing Mercedes technique, as well as general practice of the Twenties, the ports and water jacketing are welded up around these cylinder groups. Ribbing on the outside of the cylinder corresponds with corrugations on each water jacket designed to provide flexibility for expansion. Although none of the welded joints are exposed to combustion pressures Uhlenhaut said that this construction method placed definite limits on compression ratios; the figure in this case is 6.99 to 1, which is just about right for a blown engine. This drawback might have been partly contingent on the weakening effect of the four-valve head, since the two-valve M196 Grand Prix engine combined very high c.r.'s with the same fabrication system.

In 1928 a Sievers Junior Eight Special was entered at Indianapolis but didn't race; it squeezed four valves into a 51 mm bore. With this exception I know of no smaller four-valve head than that of the M165. With head diameters of 28 mm, these small valves are easy to cool — aided by mercury filling of the exhaust stems — and easy to control at high revs. Before the '39 season special attention was given the development of good high-speed cam forms for both big and little Mercs, and the smaller engine embodied some distinct changes. Since World War One Mercedes had used cam lobes whose heels were narrowed to about one-third the width of the ramping; this V8 had conventional lobes for the first time. This may have been necessitated by a new-pattern valve gear finger made of light alloy except for an inserted steel anvil right at the point of cam and valve stem contact — a clever device that would be advanced today. Valve clearance is adjusted by changing the thickness of the insert. Double coil springs exert the modest (by racing standards) maximum pressure of 187 pounds, and retain the tapered valve guides. The four-valve layout did allow easy central placement of the very special and sur-

a rugged light-alloy crankcase whose sides extend well down past the crank centerline. Very sturdy main caps are anchored conventionally and also by lateral bolts, especially important in a vee engine. The five mains are roller-type with split outer races and cages. Double rows of rollers are used at the back and middle journals, single-row bearings being used for the remainder with a supplementary ball bearing at the crank nose. Forged of nickel steel, the fully counterweighted crankshaft features hollowed ends and big end journals drilled out to the point of journal overlap. These latter drillings are traps for the oil centrifuged out from the mains by way of slinger rings in the crank cheeks.

Rollers also fill the big ends of the forged nickel-chrome steel connecting rods, which measure a compact 5.63 inches between centers and carry bronze bushings in their small ends. As at the mains, the rollers are guided by split duralumin cages. The light material is necessary to prevent excessive wear of the journals, but tended to break up in use if not frequently replaced — a simple matter in a racing engine. Plugs of the same material locate the wrist pin in the forged light-alloy piston, whose solid skirt carries two cast iron compression rings and two oil scrapers. One of the latter is placed below the wrist pin primarily to stem the flood of oil being flung off by the roller bearings. Trials of plating to retard erosion of the piston crown were being carried out on the M-165's.

A whole sumpful of small oil pumps are driven from the back of the crankshaft to pressure and scavenge various parts of the engine. One pump feeds the crank bearings and two more supply the camshafts, while a further two scavenge the front and back of the sump. An additional four (!) pumps scavenge respectively the valve gear casings, supercharger seals, crankcase breathers and the labyrinth at the back of the crank that keeps oil out of the clutch. Three gallons of oil are circulated through the dry sump system which, at 75 to 85 degrees C, ran up to 15 degrees cooler than its bigger brothers. This may have been due at least in part to the much better breathing system that could be fitted in the wider vee (90 vs. 60 degrees) of the eight. Two cylindrical breathers were laid out to release hot air while allowing oil to drip back into the clutches of the scavenge pump provided for that purpose.

A rotationally flexible coupling at the

blowers spun rather fast, at 2.78 times engine speed, and with Solex carburetion passed enough air to register 260 horses at 8500 rpm on the brake. This shows a realistic margin over the 225 at 7500 of the early Alfa and the 16-valve Maser's 220 bhp at 6600 — the ratings that applied to the Tripoli entries.

In the course of later experimentation a two-stage Roots system was designed and tried, with the happy result that 18 more horses were found at 250 less revs. It's likely that many of these ponies were recouped from the gross or indicated figure by the lower power consumption of the two-stage aggregate, thus effecting an improvement in the net output. After Tripoli Mercedes finally had time to develop its own multiple-choke carburetor for the M165, though Uhlenhaut said he would have chosen an SU-type carb had such been available in Germany.

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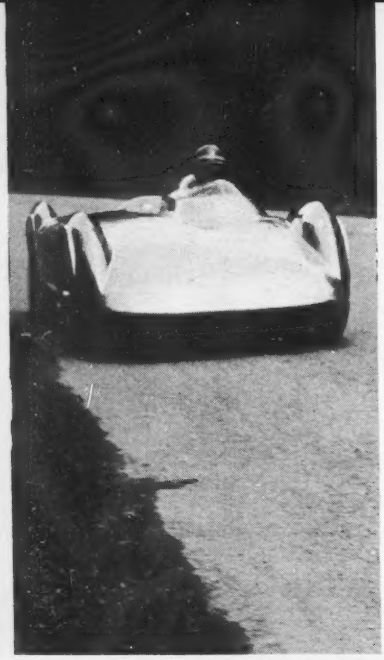
—*KL*

### *Racing Brakes*

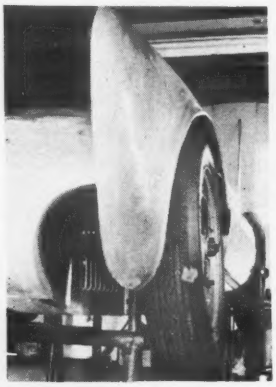
*(Continued from page 31)*

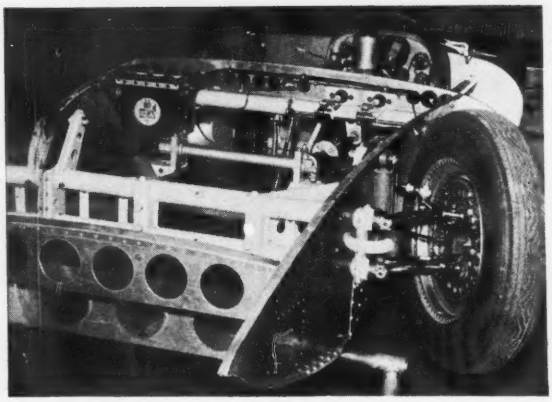
to test stand results, and adds that "above all, in braking from high speeds, the heat-storing ability of the drum must be given great attention".

Just how important this is can be illustrated by calculating the end temperature for an iron drum of the Ferrari type, adjusting the specific heat to take into account the added capacity of the magnesium face. For respective weights of 23.8 and 15.1 pounds, the final readings would be 975 and 850 degrees C! If the drums were wholly [illegible] the levels would

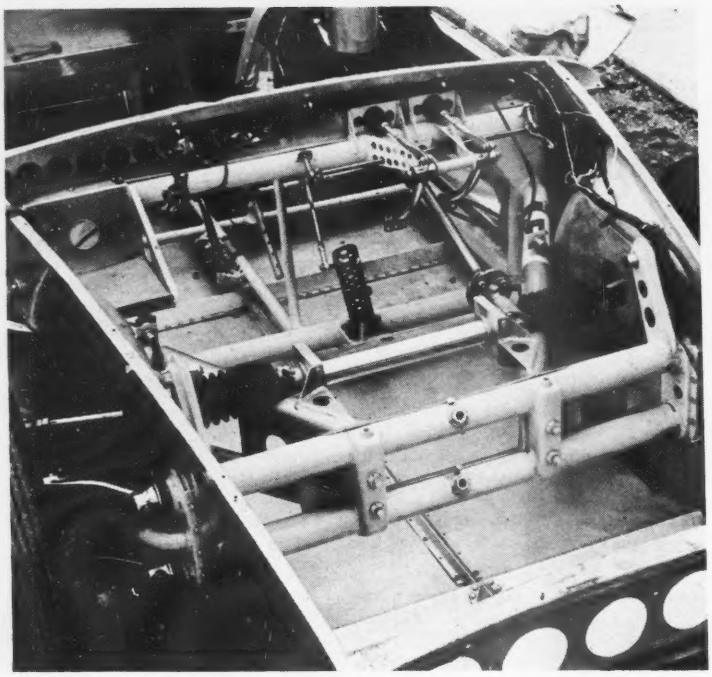


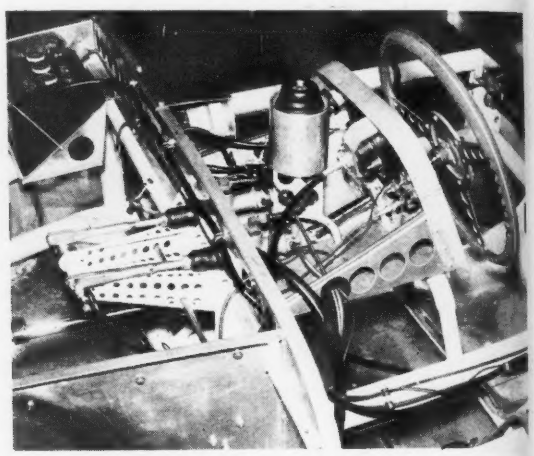
Yes, the Durlite (left) is streamlined. Vented tunnel (below) pulls hot air out of engine compartment. It also induces flow past brake drums.





Brake backing plate has been extensively drilled to reduce unsprung weight. Stock steel wheel has also received the same treatment. Polished trailing arms, and transverse tubes carrying torsion bars are all Porsche parts.





Steering shaft (above) is led through two universal joints, and is held in place by simple locking device.
Canister behind instrument panel holds hydraulic fluid for the brake system.
Basic punt structure (left) is tied together by the torsion bar housings.

rate still was higher than the stock version. However, 50-50 Monroe shocks handle the problem in good fashion, eliminating any tendency for the machine to hop, skip or jump on a rough or rolling road.

Just as important in getting a race car to go is to get it to whoa. This is accomplished via 11-inch brakes from a competition Porsche, a set up which provides restraining tendencies comparable to anchoring the little beauty to a large tree. A single master cylinder actuates two leading shoes in front, and a single leading shoe in the rear. Backing plates are ventilated.

For the boys with the well padded check books, the next step is to go out and buy a set of magnesium wheels. For those on the opposite end of the scale, it is time to pick up an electric drill and start punching away. By boring out in all unstressed areas, it has been possible to obtain a suitable drilled steel wheel. Possibly there is room for debate as to whether a "mag" wheel would do a better job in reducing the unsprung weight, but to date the lightened 15-incher has commendably remained in contact with the ground.

Ingenuity again raised its head when the operation got around to the steering gear: rack and pinion was the answer. The only question was whose? Financial considerations dictated the selection of a production unit, so a Morris Minor gear was chosen, and modified by shortening the length of the rack and housing. This achieved a truer steering geometry with trailing arm suspension.

With a close quarters envelope body, space was at a premium. Webb hurdled the cockpit access problem by using a single U-joint that permits the wheel to swing in an arc, raising it six inches and moving it two inches to one side. A simple locking mechanism fixes the steering column in its bottom position. The wheel itself is of drilled aluminum alloy, and a molded cork rim gives a more resilient grip.

When the *aficionados* of race car building gather, nothing raises the hackles on the back of their necks more than to enter into a spirited discussion on the merits of various suspension designs. The Durlite special will contribute to controversy, because at present no sway bar is used and the car has been successful in competition. An experimental bar is coming, after some of the details of its unique hookup are worked out.

This particular bar is projected for the front end, and will work in conjunction with a double-acting hydraulic

*(Continued on page 80)*

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## *Built To Win . . .*

*(Continued from page 25)*

the combustion chamber could not be very much smaller than that in the V12. It made sense to Mercedes then and it has to engine designers ever since.

The M165's cylinders are deep forgings of chrome steel, flanges at their bases being welded together to form two blocks of four cylinders. In accord with long-standing Mercedes technique, as well as general practice of the Twenties, the ports and water jacketing are welded up around these cylinder groups. Ribbing on the outside of the cylinder corresponds with corrugations on each water jacket designed to provide flexibility for expansion. Although none of the welded joints are exposed to combustion pressures Uhlenhaut said that this construction method placed definite limits on compression ratios; the figure in this case is 6.99 to 1, which is just about right for a blown engine. This drawback might have been partly contingent on the weakening effect of the four-valve head, since the two-valve M196 Grand Prix engine combined very high c.r.'s with the same fabrication system.

In 1928 a Sievers Junior Eight Special was entered at Indianapolis but didn't race; it squeezed four valves into a 51 mm bore. With this exception I know of no smaller four-valve head than that of the M165. With head diameters of 28 mm, these small valves are easy to cool — aided by mercury filling of the exhaust stems — and easy to control at high revs. Before the '39 season special attention was given the development of good high-speed cam forms for both big and little Mercs, and the smaller engine embodied some distinct changes. Since World War One Mercedes had used cam lobes whose heels were narrowed to about one-third the width of the ramping; this V8 had conventional lobes for the first time. This may have been necessitated by a new-pattern valve gear finger made of light alloy except for an inserted steel anvil right at the point of cam and valve stem contact — a clever device that would be advanced today. Valve clearance is adjusted by changing the thickness of the insert. Double coil springs exert the modest (by racing standards) maximum pressure of 187 pounds, and retain the tapered valve guides. The four-valve layout did allow easy central placement of the very special and surprisingly large 18 mm Bosch spark plugs, while the included angle between the valve stems was held to 56 degrees to allow easy valve removal.

Light alloy housings carrying the fingers and the cams, with three bearings apiece, are bolted to the cylinder groups. Running up the back of the engine, the spur gear drive to the cams was made simpler than that in the V12 at the expense of larger pinions at the ends of the cams, another departure from the bigger engine being the initiation of the drive from a gear on the crank proper instead of on the flywheel hub. Spurs up the center revolve the single Bosch magneto nestled neatly in the vee.

The cylinders are deeply spigoted into a rugged light-alloy crankcase whose sides extend well down past the crank centerline. Very sturdy main caps are anchored conventionally and also by lateral bolts, especially important in a vee engine. The five mains are roller-type with split outer races and cages. Double rows of rollers are used at the back and middle journals, single-row bearings being used for the remainder with a supplementary ball bearing at the crank nose. Forged of nickel steel, the fully counterweighted crankshaft features hollowed ends and big end journals drilled out to the point of journal overlap. These latter drillings are traps for the oil centrifuged out from the mains by way of slinger rings in the crank cheeks.

Rollers also fill the big ends of the forged nickel-chrome steel connecting rods, which measure a compact 5.63 inches between centers and carry bronze bushings in their small ends. As at the mains, the rollers are guided by split duralumin cages. The light material is necessary to prevent excessive wear of the journals, but tended to break up in use if not frequently replaced — a simple matter in a racing engine. Plugs of the same material locate the wrist pin in the forged light-alloy piston, whose solid skirt carries two cast iron compression rings and two oil scrapers. One of the latter is placed below the wrist pin primarily to stem the flood of oil being flung off by the roller bearings. Trials of plating to retard erosion of the piston crown were being carried out on the M-165's.

A whole sumpful of small oil pumps are driven from the back of the crankshaft to pressure and scavenge various parts of the engine. One pump feeds the crank bearings and two more supply the camshafts, while a further two scavenge the front and back of the sump. An additional four (!) pumps scavenge respectively the valve gear casings, supercharger seals, crankcase breathers and the labyrinth at the back of the crank that keeps oil out of the clutch. Three gallons of oil are circulated through the dry sump system which, at 75 to 85 degrees C, ran up to 15 degrees cooler than its bigger brothers. This may have been due at least in part to the much better breathing system that could be fitted in the wider vee (90 vs. 60 degrees) of the eight. Two cylindrical breathers were laid out to release hot air while allowing oil to drip back into the clutches of the scavenge pump provided for that purpose.

A rotationally flexible coupling at the crankshaft nose has as its main duty the drive of the blowers, but a bevel coaxial with an intermediate gear turns the water pump on the right at 0.7 of engine speed, and the left-side fuel pump at a mere third of crank speed. 66 US gallons of fuel are carried in tail and saddle tanks, the mixture including 4.4 percent nitro-benzole and 8.8 percent acetone with a dash of ether, the remainder methanol.

Late Mercedes superchargers used magnesium alloy casings for two-lobe rotors of nickel steel, carried in ball and roller bearings. Probably to be on the safe side when the cars raced at Tripoli they were equipped with the system of twin blowers working in parallel that had been tried thoroughly on the 1938 M154. These

blowers spun rather fast, at 2.78 times engine speed, and with Solex carburetion passed enough air to register 260 horses at 8500 rpm on the brake. This shows a realistic margin over the 225 at 7500 of the early Alfa and the 16-valve Maser's 220 bhp at 6600 – the ratings that applied to the Tripoli entries.

In the course of later experimentation a two-stage Roots system was designed and tried, with the happy result that 18 more horses were found at 250 less revs. It's likely that many of these ponies were recouped from the gross or indicated figure by the lower power consumption of the two-stage aggregate, thus effecting an improvement in the net output. After Tripoli Mercedes finally had time to develop its own multiple-choke carburetor for the M165, though Uhlenhaut said he would have chosen an SU-type carb had such been available in Germany.

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—*KL*

### *Racing Brakes*

*(Continued from page 31)*

to test stand results, and adds that "above all, in braking from high speeds, the heat-storing ability of the drum must be given great attention".

Just how important this is can be illustrated by calculating the end temperature for an iron drum of the Ferrari type, adjusting the specific heat to take into account the added capacity of the magnesium face. For respective weights of 20.8 and 15.1 pounds, the final readings would be 275 and 350 degrees C! If the drums were wholly iron the levels would be closer to 320 and 415. Acknowledging these stark facts of life, Maserati as well as Mercedes have used very large volumes of aluminum in their brake drums. The latest Maser lightweight G.P. car has a thick muff right around the liner, while the 450S sports car's colossal drums were festooned with heat-absorbing aluminum.

How did Ferrari get so deeply involved with iron drums? He seems to have made his decision during late March and early April of 1957. As a test of sports car braking, his cars for Sebring of that year were fitted with iron drums of Lancia pattern which, shrouded by wheels and fenders, couldn't hold heat and couldn't give it away either. Sebring was a fiasco, so Fer-

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### *Racing Brakes*

*(Continued from page 75)*

rari went back to deep Al-Fin drums for his sports/racing equipment. A few weeks later at Naples, Enzo had fitted one of his Lancia Grand Prix cars with a Ferarri front suspension, complete with Al-Fin drum of the old Squalo type. On the very twisty Naples circuit, with its modest demands on brakes, deceleration with these drums was compared with that of Lancia-type iron drums — probably just like those tried at Sebring — mounted on the same car. Hanging well out in the breeze, and not getting too hot anyway, the ferrous parts showed no disadvantages and were kept until the German G.P. of 1958, when bimetal drums were tried on the front wheels of Phil Hill's Formula II Dino during practice only. As so often happens, the greater weight and poorer cooling provided by the sports car showed up a braking shortcoming much sooner than did the Grand Prix car.

During the discussion of materials I've often touched on the importance of the structural strength of the brake drum, an aspect of its design which should be dealt with in a section by itself. Especially when used with stiff shoes and the very rigid molded linings, it's essential that the drum resist tendencies to distort from a perfect cylindrical shape. It can, if not properly braced, flex out of an exact circle, and can also "bell-mouth", i.e. the inner "open" drum mouth can be expanded by shoe pressure to a diameter larger than that next to the drum face. Whenever the drum is allowed to move away from the shoes, braking power is being lost, but fast.

One of the finest weapons against both types of distortion is circumferential finning, popular on racing brakes ever since there've been such things. With a given volume of drum material, far greater strength can be obtained by distributing it in ridges or fins that are as deep as practicality allows. There are countless examples of circumferential finning, but Ferrari's drums of 1951-55 were among the best, with their "tapered" finning increasing in depth near the mouth of the drum for maximum resistance to bell-mouthing. If a drum has only one rib around it, it should be right at the critical open edge. Gordini added stiffness at this point by using a drum wider than the mechanism, so that it overhung the back plate a fraction of an inch. To brace the very thin cast iron drums of the D50, Lancia designers used ten fine and deep circumferential fins.

Fins *across* the drum may be specified for cooling reasons or to stiffen a very wide drum, but when this is done it's essential, as above, to have at least one king-sized circumferential rib at the open end. Fulfillment of this requirement can be seen in the racing brakes of Porsche, Maserati, Alfa Giulietta and the SS Corvette. It's carried to a commendable extreme in the unusually wide drums used by Mercedes in the W196 and by Reventlow in the Scarab sports cars. On the other hand this requirement has been flouted on occasion with invariably poor results

In 1952 Cunningham went to considerable expense to make some Al-Fin drums with fine transverse fins milled straight across the outer surface. They were so flexible that they started to heat-spot and crack up in practice, and couldn't be used in the Le Mans race. I need hardly add that the 1958 Ferrari drum had the same deficiency – an incredible oversight for this company. Like his fellow team drivers, through the rest of the season, Phil Hill at Casablanca was defeated by the flexibility and low heat capacity of these unbelievably bad brake drums.

When bimetal drums are used, opposition to bell-mouthing can be enhanced by including a stiffening flange on the iron liner. Colombo featured this on his Alfa Romeo Type 158 and on his early postwar designs for Ferrari, both being distinguished by a series of countersunk screws in the flange which attach the liner firmly to the drum. Maserati has carried on this excellent practice since 1954 with a very deep flange (often scalloped between the rivet points) at the opening and a small one next to the drum face. The same Modenese firm has led in the use of radial ribs on the face of the drum which have a cooling function, but which also brace the braking surfaces in relation to the hubs.

More than most firms, Maserati has a good appreciation of the importance of structural strength in racing brake drum design. The same know-how shows up in the care given to the cooling of Maser brakes. Heat can escape from a brake assembly through the three classic routes. Conduction must take place but it isn't very desirable, since it can only heat up the tires and springs – which already have more than they need. Bugatti, Cooper and others have, however, used conduction to carry heat to spokes, vanes and like points where it can be dissipated. Radiation takes some of it away,usually as an after thought. Naturally any increase in finning augments surface area and thus the radiating area, but fins are most often laid out with an eye to the needs of air flow, or convection cooling. In examining convection systems, we should remember that flow can be directed through two major areas: The inside, over the shoes and linings, and over the outside of the drum.

Circumferential finning is as much a boon to convection cooling as it is to structural strength, and several examples have already been enumerated. It's a happy coincidence that a "tapered" finning layout, intended to give maximum strength at the mouth of the drum, also places the deepest fins in the path of the greatest flow of air. The experience of Wellworthy Ltd., as expressed by their Technical Director, Mr. Blackith, has been that circumferential finning is to be preferred whenever the drum is mounted well out in the air stream. Lancia produced a practical expression of this idea on one of their D50's at the debut of the type at Barcelona, 1954. The wide drums were half shrouded by the wheel rims, only the exposed half having circumferential finning. I'll discuss the shrouded half later.

The classic companion of circumferential finning has been the scoop in the backing plate, intended to draw air in over the working machinery. It just as effectively attracts water and dirt, a cover or a screen sometimes being demanded by road conditions. Scoops started to sprout in the early Thirties, with the '34 Maserati among the pioneers. In 1935 Mercedes had 'em, with a small separate scoop to cool the wheel cylinder! The Mercs and Auto-Unions brought air in with a scoop and let it out through a series of slots at the trailing edge of the back plate. Narrow air slits were given the 158 Alfas, while the early postwar Ferraris were vented much like the prewar German cars. Before the war the Maserati brothers had already developed the big, symmetrical, cast-in entry and exit scoops that adorned the 4CLT series, and formed a pattern for the smaller dual (four per wheel) intake and exhaust scoops on the '52-'53 Formula II Maseratis. Around 1948 the Porsche-designed Cisitalia G.P. car set a record for size of rear brake scoops, having huge sheet-metal funnels extending well forward of the backing plates. This theme was extended to all four wheels and to a logical extreme by a Cisitaliaesque prototype built in France by Sacha-Gordine.

It would seem that backing plate scoops are a straightforward way of ensuring an internal flow of air, and that they'd easily be worth the small trouble it takes to provide them. Yet since the early Fifties we've seen them wither away to the point where no major competition car uses anything more imposing than a few holes or slots in the backing plate. Scoops have been supplanted, whether rightly or not, by the concept of *forced air flow*.

Once again, Mercedes is behind this. To balance the improved performance of their 1939 Grand Prix car they developed a drum which used the principle of the

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### *Racing Brakes*

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centrifugal fan to draw air over the outside of its braking surface. Short passages, angled slightly to take advantage of the direction of motion of the car, were cast across this surface and provided with radially-pointing exits adjacent to the stiffening ring cast at the drum mouth. All of the drum except these exits was shrouded by the wheel rim. Used on all four wheels, these showed measurably reduced drum and lining temperatures. For the M-B resurgence 15 years later a modified version of this was revived, without angled passages and with the air intakes curved around the drum corner to be almost radial. This gave added impetus to the centrifugal action, which was at a maximum anyway since the whole system of passages is cast in at the radial extremity of the drum, where velocities are the highest. In all cases Mercedes concentrated all their attention on cooling the braking surfaces, which are the source of heat, leaving the drum faces alone.

While he was drawing up the center-pivot mechanism, Aurelio Lampredi made some sketches for a new method of venting the face of the drum, to replace the simple punched holes that had been so popular for so long. Half a dozen radial channels were cast into the drum face so as to fling hot air out of the interior, fresh air being drawn in through screened holes in the back plate. This uncomplicated trick worked so well that the six-spoked shape became a trademark of Ferrari brakes. It's still found on some 3 and 4.9 liter Ferrari sports cars, and has spread to Fiat passenger cars and even to the Fiat-built O.M. trucks, in which it's incorporated with the rim-supporting spokes.

A logical blend of the Mercedes and Ferrari approaches was achieved by Colombo in late 1952, when he was modifying Maserati's Formula II A6GCM single-seater. Radial ribs were cast into the outer surface of the face of each of the front drums, and were carried out until they curved over the braking surface, becoming transverse fins at that point. Holes were drilled through the face between each rib, and the whole shebang, except for the last bit of finning around the periphery, was covered by a spun sheet of aluminum. The effect was of 32 ducts from the drum's interior, radiating out over the face and the braking surface to exits at the point of highest velocity. Apparently effective, this arrangement was incorporated in the completely new 250F and 300S Maseratis of 1954 and 1955, at all four wheels. Late 300S brakes, and the massive drums of the 450S, as well as the "production" 3500GT Maserati, have had the channels cored right into the drum casting. In these cases the fins over the braking surface are usually left exposed.

In view of the fact that the Formula I Maseratis used these drums, with the sheet metal shrouding, without exception through the 1956 season, it was surprising to see one car of three at Argentina in '57 equipped with a new drum with the ribs and holes but without the cover. At Syra-

cuse shortly thereafter the cars had new wider drums of 360 mm diameter, and with only token provisions for the possible use of a shroud to make centrifugal channels out of the face vents and shallow ribs. Since then every new Maser racing drum has had these provisions but none has ever used them; in the newest front drums for the "Piccolo" G.P. car the ribs are near-vestigial.

Jumping back to 1954, we find that a leaf from the Lampredi notebook had been taken by the Lancia D50's designers, who built a centrifugal venting system into the outer third of their drum's face. 18 holes to the interior were drilled between every other one of 36 short radial ribs which tapered down into the drum face at the ends nearest the wheel hub. An annular sheet alloy cover screwed down over the ribs to make channels of them, as in the Maserati layout. 18 holes punched in the cover communicated with those channels that weren't already involved in extracting air from the drum interior. That one D50 at Barcelona in '54 had intriguing extensions of these channels over the half of the drum shrouded by the wheel, but these were dropped when the iron braking surfaces were adopted.

Ferrari kept these rib covers in place the whole time he used the Lancias, which was from late 1955 through the 1957 season. Possibly influenced by this approach, the good Enzo used a sheet metal cover with fabricated ribs to reproduce his own face venting system on his 2 liter Testa Rossa sports cars of 1956. The influence was more obvious in the experimental Dinos of 1957, which applied their linings to drums which were naught but tracings, in smaller scale, of the Lancia parts. Ferrari used the channel covers at Modena and Morocco but stripped them off during testing early in '58, and when his modified front drums appeared at Naples they were seen to have anchors and ribs for a cover to form eight big vents, but such covers were never used in racing. The later bimetal drums from Maranello had no provisions for centrifugal venting at all.

For his sports cars, Ferrari seems to have been able to take forced air flow or leave it alone. Since his Sebring experience he seems content to supply large masses of aluminum to hold the heat until he can get rid of it. Maserati, on the other hand, have used centrifugal systems on most of their post-'53 fendered equipment, and also found it useful on those G.P. cars which had the front drums partially shielded by the wheel rim. Mr. Blackith of Al-Fin deplores any such shielding, as do most lining makers as well, and suggests that if it's unavoidable, the finning might best be placed transversely. Mercedes used forced flow to great advantage, on drums that were either concealed within the wheel or beneath body sheet metal. Likewise the RAI Scarabs have very nice centrifugal ducting on drums that are inboard at the back and buried in the wheels at front.

Yet in Grand Prix cars, on drums which were well offset from the wheel and not surrounded by fenders, both Ferrari and Maserati tried centrifugal cooling and later gave it up, apparently finding cooling just

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## Raising Spyders At Home

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cylinder fastened to its left-end anchor point. The cylinder will have a cockpit adjustment mechanism that gives varying roll resistance on either right or left turns. The settings can be stiff or limber, dependent upon the particular course and the effects desired. By altering the roll resistance, and/or jacking the weight, it will be possible to regulate the handling characteristics.

At the rear of this machine, parallel torsion bars lie just aft of the driver's seat. In keeping with the theme of having as flexible a unit as possible, the ends of these bars are equipped with adjusting nuts within easy reach of the driver, making it possible to change their settings during the actual running of a race.

One of the most difficult segments of hand building an automobile is the body. It is here the individual designer either comes to the fore, or makes a grand retreat by falling flat on his face. Fortunately, Webb's past experience as a body man enabled him to land on his feet through the creation of fabrication concepts that make the skin serve more than one function.

The body does not follow the Indianapolis school of thought which uses tubular sub-structure to hold the unstressed skin to the frame: nor does it follow the Italian school which firmly affixes the body panels to the chassis and uses these panels as stress members. The Webb method employs a series of stressed aluminum bulkheads as the main body structure. By taking aluminum sheet for the floor, firewall, cowl, wheel housings and body formers, and mating them to the frame, it has been possible to obtain all the benefits derived from the low-load factors of stressed-skin construction, plus the advantages of a tubular backbone to assist in achieving maximum rigidity.

This principal of stressed skin accounts in part for what seems to be an exploding automobile during a bad crash. Should Webb get on his head in the course of a mean stackup, he figures the bulkhead concept will keep the machine together, and give him a better chance of riding it out. The top skin is in four basic pieces: integral front hood and fender unit; two side panels; and integral rear deck and fender unit. Also included are the doors and a cockpit canopy with wraparound windscreen. The assembly amounts to 10.7 square feet of frontal area, with some aerodynamic factors being sacrificed for styling and ducting to cool the brakes.

Skin is .064 3S H14 aluminum, a gage that is slightly on the heavy side for the sake of ruggedness. The finished product gives the impression of stamped panels, instead of being hand formed, as no flaws are discernible. Since the builder has an abhorrence of Dzus fasteners, panels are fastened by aircraft-type bolts and captive nuts. Accessibility for inspection is good. The finish is unpainted polished aluminum.

Another unusual part of the chassis is the nine gallon fuel tank, fabricated with a baffled trap. This prevents loss of fuel on turns if the tank level is low. The outrigger-type tank is contoured around the frame tubes, using them as anchor points — one thing doing several jobs.

When an inspection committee gets around to the engine compartment, they generally stop and stare in disbelief. Nestled securely in the depths is a very standard and rather nondescript-looking Porsche 1500. No gleaming four-cammer greets the eye, but simply a completely orthodox "Normal" push rodder set up to give about 55-horsepower in top tune. This generally elicits considerable laughter among those who are accustomed to going out and purchasing the best that is being offered; but somehow the levity got lost in the roar of the exhaust when this particular Spyder finished second in class during its first outing at the national Lawrenceville, Ill., meet, polishing off an assortment of Oscas, Porsche 550's, and the like. What somebody forgot to do was to take off his shoes and count up to 850, the weight of this car in pounds. The Spyder conceded a top Porsche 550 approximately four per cent better lap times, but held the rest at bay by exceptionally rapid acceleration on a course where no opportunity was provided to get into the top end of the speed range.

Without question, if this is to turn into a really hairy-chested hunk of machinery, a new engine is a must. Still, there is no intention to use the four-overhead-cam job, because the project was founded on the principle of an economy competition car, and economical it is going to stay. This means a raise in compression ratio to 8.5 to 1, a Super cam, Solex 40 PBIC carburetors, and proper attention to porting, valves, and springs, to bring the present engine up to Super specifications. Something in excess of 75-horsepower can be expected.

In its present state, the car represents approximately $1000 cash money, plus uncounted hours of hard work. Webb is not kidding himself that a factory can't build a more potent wagon capable of blowing him right off the race track. But he still maintains that for a minimum amount of dough he has a car which can give them a good tussle under certain conditions.

One of the prerequisites of doing this is to stay off race tracks where 150 mph straightaway speeds are tantamount to dragging your feet. If it is possible to gear for around 110 mph. top, and stay with the hot boys, then the special builder on a limited budget has a fighting chance. Other than that, he might as well say, "ta-ta," when the competition flies past, and begin thinking about getting into some other sport.

*—gm*

**Coming Next Month**

**Enzo Ferrari**
**by Steve McNamara**

**Racing Brakes**
**Part III**
**by Karl E. Ludvigsen**

**Breakfast with Farina**
**by Griff Borgeson**

### *Singer Gazelle Series II*

*(Continued from page 55)*

good for a 1500 cc sedan. So is the car's top speed. We used the customary one-mile approach to the quarter-mile timing trap and entered indicating about 85 and left about 89. Thus, our *actual* 83.4 mph top speed could be improved upon with a longer run; terminal velocity probably is around 88 mph.

There runs were made, of course, with top up and windows closed. The wind noise generated by the convertible body is unusually low and the car's stability is excellent when going full tilt. The top does not drum at any speed.

The ride of the Series III represents a beautiful balance of firmness versus softness. As a ride that is equally satisfying on smooth payment of rutted dirt it is excellent and it won the enthusiastic endorsement of both male and female members of SCI's staff.

As a handling car the Series III also is quite good. Recirculating-ball steering is hard to beat and the Singer now has it. The car has a slight understeer tendency, can be cornered quite rapidly and drifts nicely when extended in the turns. It is not a sports car, however, as you find the first time you rock the steering wheel while moving down the straight. The body responds by rocking freely on the springs. Thus there is a marked lean on the corners and body rocking in S-curves. On one occasion we were committed to a line around a curve and were moving at

*(Continued on page 86)*

### *Most Expensive Victory*

*(Continued from page 23)*

Gradually, now, the silver cars began letting up more and more, and when the race finally ran out, Lang won in 1:59:-12.36, or 122.9 mph, having slowed up considerably when it was realized that there was no need to go "fast". Caracciola finished second 2:37 away, then Emilio Villoresi was third, with the first Alfa-Romeo, eight minutes after Lang. The regulations specified that cars had to continue going round and round until they completed the full distance or were flagged off: half an hour later cars were still screaming round and round! Twelve finished in this historic race, of thirty starters.

This was probably the most expensive racing victory in the world — although, by the same token, it was probably one of the most effective. Soon after the Tripoli race, war broke out, and the cars were embargoed in Switzerland. When war ended they were still there, and a number of ingenious projects were thought up by various people desirous of obtaining the two cars and racing them in the 1947-50 formula. However, it was a number of years later that the cars came up for auction and they were purchased by a mystery buyer which later turned out to be Daimler-Benz A.G. Today, one of the cars is in the Mercedes museum at Stuttgart, as one more milestone in the history of one of the most famous marques in the world.

— *f k*

## *Le Mans*

*(Continued from page 41)*

The last all-American appearance was probably the most significant. Looking at it in the light of present day F.I.A. regulations of 3-liter top limit makes it even more significant. Cunningham made a complete change for 1955 and introduced the C.6.R. It had an Offenhauser engine of 2942 c.c.'s capacity. It was typically "Offy" with four big bore (100.8 mm) cylinders and twin o.h.c. The front suspension was double wishbone and the rear-end was de Dion. The finished job was the most photogenic car at Le Mans. The body was aerodynamically and aesthetically right. But the gremlins were at work for at 10:30 on Sunday morning, it was out with transmission failure.

It was an undeserved end to a magnificent endeavour. But was it the end? Briggs Cunningham was a crusader in the sports-car cause. He was years ahead of his time, building highly competitive American cars, at a time when Detroit ignored the existence of such models, and only a select few fellow Americans were buying imported European sports-cars. As his campaign continued so did the rise in U. S. sports car figures. Apart from this answer to the European automobile industry's prayer, the driver situation began to alter visibly. Visiting Americans became the rule rather than a sensation at any big meeting. By 1955 John Fitch was driving in that unique team of 300 SLR's fielded by Mercedes-Benz. With Stirling Moss he won the Ulster T. T. at record speed. Gregory, Said, Shelby, Hugus, and many others, are now standard and respected competition on European circuits.

In the order of things it was inevitable that an American would win at Le Mans. Ferrari did himself a special favour at the start of last season by signing Phil Hill. Apart from his Formula I brilliance, which the late Mike Hawthorn forecast would bring him the World's Championship this year, he has displayed a sensitive feeling for the Ferrari two seaters, which must give him a greater chance this year, of joining the immortal few who have been double winners at Le Mans.

Hill's win last year was still only half way in the fulfillment of the Cunningham crusade. The meteoric arrival of the Scarabs and the Sadlers last year, is the herald of the new campaign. F.I.A. regulations on the 3-liter limit cancelled the use of the Chevrolet V8 engine. I give it two years for another all-American assault on the greatest race in the sports car year. Will it win? There may be a formula for that answer, based on the ratio of American sports car increases to the number of right-hand turns at Le Mans, but experience teaches the folly of forecasting winners in motorsport. Of one thing I am sure; the European pits at Le Mans will not be complacent about an All-American entry next time.

*—h. mcg.*

## *Argentina Grand Prix Racing*

*(Continued from page 69)*

A rookie in the big league, Fangio gave the ultimate evidence of his potential by engaging in a wheel to wheel duel with the French ace. They traded "fastest lap" time and again; Fangio was forced out with an overheating engine, but set the lap-record for the day.

Farina drove the three-liter Maserati to victory at Mar del Plata City, a 4,045 meter course for which the big car was particularly unsuited. He managed to trail Villoresi throughout the race and came in first when "Gigi" stalled with an ailing engine, with Varzi trailing. Suddenly, the big Maserati began to pour thick smoke; the clutch was burning — Gigi jumped back into his car, assuming Farina was through. But it was Farina's lucky day; he decided not to shift gears and therefore managed to hold his position to the finish. Varzi came in second; Wimille third.

1949. The Temporada was a success: prizes attracted more prominent figures from Europe in 1949 — more and better race-cars. Two "works" Maseratis — San Remo type — driven by Villoresi and Ascari; a similar car for Fangio and a 1500 cc blown "works" Ferrari (with a two-liter spare engine) for Farina. Wimille had a 1.4 Simca, Prince Bira of Siam and Reg Parnell of England were in privately-entered San Remo Maseratis. During practice, tragedy struck, and Wimille was killed as his Simca spun out, hit the hay-bales and overturned.

Villoresi set the fastest qualifying time for the Palermo course: 2:30.2. "National Mechanics" hop-ups ran a preliminary race called the "Jean Pierre Wimille Memorial" which Fangio won easily in his Chevrolet.

Alberto Ascari won the big race — his first major victory — at an average of 70.23 mph. Villoresi came in second and Fangio third: Ascari led all the way, while Villoresi and Fangio fought a keen battle for second place, until an emergency pit-stop put the latter out of contention.

The second race at Buenos Aires started with Ascari, Villoresi, Fangio and Galvez in the front group. It started to rain and Fangio spun out. Villoresi gave up with valve trouble; Ascari stayed in front, Farina passed Galvez, but then both Ascari and Farina were forced out. Oscar Galvez drove the old 3.8 to win, with Fangio, who had made up for lost ground, finishing second. The victory of a local driver created great interest in the upcoming Rosario City Race. But rain interfered again: skids, tangles and mechanical trouble played havoc. Farina won at 48.5 mph, followed by Parnell and Ascari.

Tragedy was again present when the 1949 program closed at Mar del Plata. Local driver Adrino Malusardi was killed as his 3.2 Alfa rolled over and caught fire during qualification trials. Villoresi was on the pole for the race, but his Maserati failed to get away, creating considerable confusion behind. Fangio and Ascari fought for the lead at the very start, but as they sped down the homestretch, it was Fangio in front. He held the lead to the finish, but for many laps he had to strain to the limit to keep ahead of Ascari. Villoresi made up for the poor start and climbed to third position, but both he and Ascari were having trouble. Ascari made a pit stop which cost him time; Villoresi gave up at the half-way mark with engine trouble.

After these races, Fangio made his second trip to Europe, with a San Remo Maserati, starting on the winning streak that was to last for years.

1950. With Fangio already in the upper ranks, Argentine fans were looking forward to the next races in Buenos Aires. The 1950 Temporada opened in December, 1949. Favorites were Fangio, Villoresi and Ascari, all three driving two-liter, two-stage blown V12 Ferraris. The list of European drivers was long: Farina, Chiron, Bira, Taruffi, Carini, Parnell, Biondetti, Bonetto, de Graffenried: all on Maseratis. Whitehead and Searfini on Ferris; Philippe Etancelin and Louis Rosier on 4.5 (unblown) Talbots; Manfred von Brauchitsch on a 32-valve three-liter Maserati owned by a local driver. Von Brauchitsch made several impressive practice runs in the big job, but did not start in the races. Unofficial reports had it that he was ordered to remain a spectator at the firm request of the other European drivers. Allegedly for safety reasons. But someone else pointed out that Manfred had proven too hard to beat. This episode is still rather mysterious.

Ascari won the first race from start to finish. He beat Fangio through the gears at the go-signal and stayed in front. While Fangio and Villoresi were putting up a dog-fight for second place, he enlarged his lead consistently throughout the race. Ascari's winning average for the 35 laps was 71.336 mph. Fangio set the lap record: 2:29.6. Finishing positions were: Ascari, Fangio, Villoresi, Campos and Gonzalez. This had been Jose Froilan Gonzalez' debut at the wheel of a GP car, a 4CL Maserati, and he showed great promise.

Ascari was the first man out of the second race, as his Ferrari spun and hit the hay-bales at the getaway. Fangio took the lead and lowered the lap record with one in 2:28.8. Villoresi placed second and broke Fangio's mark during his charge, with a lap in 2:28.4. The Argentinian seemed to have everything under control, but he lost his chance as he pulled into the pits for a wheel-change. The wire spokes had broken, the wheel jammed on the splines and 2½-minutes passed before he could restart. Villoresi came in first, followed by Serafini and Bucci.

Fangio, Ascari, Farina and Villoresi, in that order, led at the start of the Mar del Plata race. Villoresi got on Fangio's tail on the 10th lap; then passed him. Fangio tried to regain the lead and stuck to Villoresi closely. They tangled on the 13th lap and were both forced out. Ascari won, followed by Farina and Taruffi.

Fangio broke the qualifying record at Rosario with a lap in 1:43.1. He led the race for several laps, then engine trouble forced him out, and Villoresi had no difficulty in getting in front and staying there to finish. Campos came in second and Farina third. *—va*

## *Singer Gazelle Series*

*(Continued from page 82)*

50 mph. Approaching us around the curve came a car moving at about 70 and partially sideways. It was advisable to move to a safer line of larger radius and abruptly straightening the front wheels caused the body to change its attitude and the rear wheels to break loose momentarily.

Every car has its limits and they are very important to learn. Fortunately while we had the Singer the Southwest's months-long drought was broken by heavy rain and we were able to learn about the car's behaviour in the wet. To the credit of the chassis and particularly to that of the British Goodyear tires, running in the wet seemed not to affect road adhesion of this combination. Even hard braking on wet asphalt failed to produce any loss of traction.

The late spring rain permitted a thorough test of the convertible's weather-tightness. Both passenger space and trunk remained dry. The soft top's effectiveness in sealing against wind was excellent. The unit-construction Series III convertible is much more ruggedly reinforced than its predecessors and our test car was impressively free—for a convertible—from squeaks and rattles. The construction of the convertible top is similar to that used by English Ford. There is a definite knack to erecting it and our test car's top required the use of much brawn. This perhaps can be corrected by adjustment of the accessible center-pillar stop screws.

The effort required to manipulate the top is our most serious criticism of this car. There is only one other: the throttle spring is too weak to provide any support for the foot. You can fix this yourself for a dime. Gas mileage is not all that you might expect from a 1500 cc machine but its performance is above expectations. The Gazelle draws admiring glances and comments everywhere and the quality of its finish throughout inspires well-founded pride of possession. It is bound to do well on the American market.

—*gb*

## *Chrysler 300E*

*(Continued from page 27)*

but the fully automatic "six-way" adjustable front seat provides many of the former's advantages plus several of its own. A long blade-like switch is mounted horizontally on the driver's side of the seat cushion. Sliding it fore and aft has the expected result, but "bending" it up or down will, with a great whirring of small electric motors, raise or lower the seat. The nice touch is that the front end of the switch controls a motor at the front of the seat while the other end controls one at the rear. The result is that the whole seat can be tipped forward or back to give either an attentive upright position or a comfortable, reclining one—or any position in between. At the risk of running the battery down, it is quite fascinating to run the mechanism through its paces, exploring its full range of positions. Of course, the reclining position is a result of the difference of the front and rear heights, so with full recline, there isn't any chance to vary the height. But as the degree of recline is paid off, more and more height adjustment becomes possible. At all times the full range of fore and aft adjustment is available so there would seem to be a position available to suit every potential driver. We noticed occasionally that after extensive use, the switch would refuse to function for a few minutes. Perhaps the wiring is protected by circuit breakers, for after a while, everything would work satisfactorily.

We cannot emphasize too strongly how important a comfortable seating position is to good driving. In addition, the ability to change position occasionally will delay the onset of driving fatigue.

A car like this is so good that when we look at it, we tend to be horribly critical, pointing out all the things that keep it short of perfection. This is pretty unfair when you realize that it sells for only $5318½, suggested base price at Detroit.

At this price it is indeed long on performance (albeit at the expense of operating economy) and understandably short on detail quality. To make it with the quality, say, of a Mercedes-Benz would more than double its price. To many, this wouldn't be desirable. At it is now, it is probably considered amongst our readers as one of the best possible tow-cars for sports-racing cars. (Take *that*, Detroit!)

It's also, we would point out, absolutely top-notch for fast comfortable touring. Though most readers would probably prefer something sportier-looking, there's nothing as fast, as comfortable and as civilized in the world. We took it from New York to Cape Cod for a weekend and enjoyed it very much. It was as agile as one could want on secondary roads (they still exist, thank goodness), while on the new Connecticut Turnpike it practically drove itself. The only thing we could have asked for was a two-bit dispenser that would throw quarters at the too frequent toll stations as we whizzed by.

For roads such as this, an interesting device called the Autopilot has been developed. Most of it is within an aluminum case under the hood, but on the steering column is a knob, a dial, and a pushbutton.

The twist knob is set to any speed between under-30 and over-90 that you don't wish to exceed. When the car reaches that speed, the accelerator spring becomes much stronger at any throttle opening larger than what's necessary to maintain speed. If you come to a hill the pre-loaded spring "moves away" when the speed drops 1 or 2 mph. Your foot pressure then opens the throttle the necessary amount and when you reach the top, it will close again as the spring force pushes your foot back. So far it's useful in heavily patrolled areas where speed limits are lower than one likes. The final touch is the push button part. Press it while driving at a selected speed and then no force at all is required on the accelerator. From now until the brakes are touched, the Chrysler will maintain the same speed uphill and down. Around corners too, which is almost as disconcerting as reaching down and cranking up the cruise speed by ten knots or so. The response to the latter takes place at

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## *Skoda Sports*

*(Continued from page 35)*

braking is more easily controlled at the expense of a slight increase in pedal pressure.

The wire wheels have dural rims and are of the standard center lock design. Tires are of domestic manufacture known by the trade name Barum, and seem to fulfill the factory's requirements.

Steering is by worm and nut with the steering box located on the left side of the car. A tie rod connects to the left wheel directly from the steering arm, while an idler is located in the same position as the steering box on the right side of the car and transmits motion to the right wheel. To ease entry into the car, the steering wheel is removable.

The electrical system is 12 volt, with all required lighting corresponding to regulations. The headlights were originally designed as retractable, and are shown this way in the photographs, but were later relocated in the front fenders and covered by plastic shields that follow the contour of the body. All connections are by multiple sockets to ease disassembly of the bodywork.

To ease the strain on the battery during frequent starting of the engine, the system is equipped with jacks for connection of an auxiliary battery.

Whether or not the new SKODA will appear on the international racing scene in the near future is best explained by this statement from the factory:

"The new racing sports car SKODA 1100 OHC is so far in the initial stage of its testing development, and at the very beginning of its career in speed sports events. Although the results of its runs have so far been very promising, it is only natural that petty deficiencies will come up, and will be eliminated step by step according to the experience in running. In the initial tests the car has fulfilled the basic requirements with which it has been constructed and built. The results obtained seem to indicate that the definite alterations of the car would not require a too long development and tests. The alterations, by which the former basic parametre of the car has been lifted to the required level are mostly of such a character, that have been foreseen by the original design already, which however could not be realized immediately during the manufacture of the new car. It is in the first place the possibility to decrease the weight of the car by 70 to 80 kgs. (154 to 176 lbs., the car now weighs 1215 lbs.) in that the consequential decrease of weight will be carried out in all detail parts, as well as by the consistent use of materials originally prescribed by the construction. The weight of the finished car exceeded the limit anticipated by the designers, especially due to deviations in material selections, that had to be accepted in the course of the manufacture as some of the materials were not available. The possibility to decrease the weight of the car and to further increase output of the engine give a good hope that the SKODA 1100 OHC will be ready to start in contests abroad, where it will represent its mark and thus the standard cars SKODA 440."

*—dgt*

## *Racing Brakes*

*(Continued from page 79)*

as good or better without the alloy shields which guided air into the cast channels. Of course brake drums so happily mounted receive the most strong and direct cooling breeze any automobile could provide, yet without back plate scoops, as these Italians are wont to run, that's no guarantee of a flow of air through the inside of the drum. It may just be possible that *radiation* has more of an effect on drum cooling than has been acknowledged so far. Nothing, for example, could have hindered radiation from the face of the drum more effectively than a shiny aluminum cover — just the sort of thing you'd place between intake and exhaust manifolds to *block* heat flow. Aluminum fenders and alloy wheel rims would be no help either. The release of energy from an object by radiation increases as about the fourth power of its absolute temperature; at the remarkable levels reached by some brake drums such dissipation would increase rapidly in significance. Yes, even the color a drum is painted could be indispensable to its cooling!

Another postwar phenomenon has been the widespread use of angled or helical fins for the braking surface of the drum, most of these being laid out to make use of the motion of the car to move air in one direction or another. If such fins are well laid out and properly united with a stiffening ring at the mouth of the drum, they are undoubtedly helpful, especially when the drum has to be tucked inside the wheel. The ducting on the W163 Mercedes drum had such an angle, but this was mainly as an aid to the centrifugal system, as is the angle used on the 3500GT Maserati. In 1951 and 1952 Cunningham was working with helical fins, and Alfa's 1900 TI sedan adopted them late in 1953 in the same form as they appear on the Giuliettas today. Excepting the ill-fated Ferrari excursion, Porsche and Borgward are the main exponents of angled finning today, the drums on their racing sports cars being well buried in the wheels.

Speaking of Porsche, their policy of bolting a rim-type wheel to the drum must be a boon to cooling of the face, as is the curved-spoke wheel used on most Cooper cars. Nardi went to the logical extreme along these lines in his rear-engined Lancia-based Formula II car, which had the front drums mounted *outboard* of the wheels. It makes as much sense today as it did then, particularly for sports cars.

Air-cooled brakes may even go out of style. Engineers at Raybestos have been working on liquid cooling for some time, one of the first indications of progress being the installation on the Cunningham-modified Ferrari run at Le Mans in 1954. This car had an independent shoe-cooling system (stripped out when the Ferrari got back to the States), unlike later adaptations for production cars which have used water from the engine cooling circuit.

General Motors have some original thoughts on such subjects as oil-cooled brakes, and have developed such wild variations on the bimetal construction theme as the peg-anchored drums used by Chevy and Buick, and the molybdenum-sprayed aluminum retarders on Firebird III. The forced air flow layout on the drums of the latter is, by the way, much like that used by Maserati, except that the Firebird's channels draw air from the exterior instead of from the inside of the drum. The 'Bird III has another related message for us, in that it uses drum brakes where its predecessor, the 'Bird II, used discs — a trend diametrically opposite that now current in Grand Prix racing. Why are discs so rapidly infiltrating the G.P. field? Are they necessarily better than highly-developed drum designs like those of Maserati and Mercedes? In the next and final part of this tale, I'll take up the controversial spots, discs and calipers.

*To be continued*

### BMW 600

*(Continued from page 45)*

Price at East Coast POE....$1398
Price at West Coast POE....$1495

U.S. Importer: Fadex Commercial Corp.
487 Park Ave., New York 22, N. Y.

#### PERFORMANCE

**TOP SPEED:**
65 mph

**ACCELERATION:**

| From zero to | seconds |
|---|---|
| 30 mph | 6.7 |
| 40 mph | 11.4 |
| 50 mph | 19.3 |
| Standing ¼ mile | 24.7 |
| Speed at end of quarter | 54 mph |

**SPEED RANGES IN GEARS:**

| | |
|---|---|
| I | 0-18 |
| II | 7-32 |
| III | 11-50 |
| IV | 17-top |

**SPEEDOMETER CORRECTION:**

| Indicated Speed | Timed Speed |
|---|---|
| 30 | 28 |
| 40 | 38 |
| 50 | 47 |
| 60 | 57 |

**FUEL CONSUMPTION:**
Hard driving....46½ mpg

#### SPECIFICATIONS

**POWER UNIT:**

| | |
|---|---|
| Type | Air-cooled opposed twin |
| Bore & Stroke | 2.91 x 2.68 in (74 x 68 mm) |
| Stroke/Bore Ratio | 0.92/1 |
| Displacement | 35.7 cu in (582 cc) |
| Compression Ratio | 6.8/1 |
| Carburetion by | One sidedraft Zenith KL/P1 |
| Max. Power | 19.5(din) bhp @ 4500 rpm (23 SAE) |
| Max. Torque | 28.5 lbs-ft @ 3000 rpm |

**DRIVE TRAIN:**

| Transmission ratios | | overall ratio |
|---|---|---|
| I | 3.45 | (18.75) |
| II | 1.94 | (10.53) |
| III | 1.27 | ( 6.89) |
| IV | 0.846 | ( 4.70) |

Final drive ratio 5.43
Axle torque taken by engine mounts

**CHASSIS:**

Ladder-type tubular frame

| | |
|---|---|
| Wheelbase | 67 in |
| Tread, front and rear | 48, 45¾ in |
| Front Suspension | Dubonnet leading arms, coil springs |
| Rear Suspension | Single trailing arms, coil springs |
| Shock absorbers | telescopic |
| Steering type | worm gear |
| Steering wheel turns L to L | 2⅛ |
| Turning diameter, curb to curb | 28 ft |
| Brakes | 7.1 in drums |
| Brake lining area | 67 sq in |
| Tire size | 5.20 x 10 |

**GENERAL:**

| | |
|---|---|
| Length | 114 in |
| Width | 55 in |
| Height | 54 in |
| Curb Weight | 1230 lbs |
| Weight, as tested | 1320 lbs |
| Weight distribution, F/R as tested | 43/57 (39/61 empty) |
| Fuel capacity | 5⅝ U.S. Gallons |

**RATING FACTORS:**

| | |
|---|---|
| Specific Power Output | 0.55 din bhp/cu in (0.64 SAE) |
| Power to Weight Ratio, as tested | 68 lbs/hp (din) (57 SAE) |
| Piston speed @ 60 mph | 2120 ft/min |
| Braking Area, as tested | 101 sq in/ton |
| Speed @ 1000 rpm in top gear | 12.6 mph |

*(Continued on page 90)*

## *Chrysler 300E*

*(Continued from page 86)*

nearly full throttle, which is dynamic to say the least.

This device fills an unfortunate need in this country, for nothing can be duller than "cruising" down a turnpike at the legal limit plus whatever you figure the Highway Patrol will allow. It's a sad commentary on the current state of affairs that now that American cars *are* becoming more pleasant to drive, the environment is becoming less so. But that's the way it is.

As usual, we have doubts about such devices. For instance, with one less thing to do, driving is admittedly less tiring. But there's nothing to keep a driver from starting out tired, so won't he fall asleep much more easily? He now has less to stimulate his senses and require his attention. As with all simplifications of driving technique, it has both advantages and drawbacks. We would suggest only that the Autopilot be turned off when the driver feels the least bit drowsy. (But when you're sleepy is just when it's hardest to remember such discipline.)

The 300E is well-equipped with mirrors. Both are ingenious, but both have faults. The outside one is adjustable from the driver's seat with a small toggle on the dashboard. It works smoothly enough, but the mirror itself is so far away that it offers an inadequate field of view. What to do? If it had a convex surface, it would have little use for estimating distances. If, better yet, it were moved closer, then it could be easily adjusted by hand (and how can you advertise that?)

The interior mirror contains an electric eye which dips it whenever the light from behind is too bright. Two stages of control care for city and open highway conditions. So far so good. What the mirror designer forgot was to confer with the upholstery shop. In the dipped position, the view through the rear window is thoroughly obscured by the pale image of brightly shining ceiling trim. And if any passenger should be well-upholstered enough himself to try the central seating area, the movements of his head will be telegraphed as his shadow covers and uncovers the photo-electric cell. Fortunately, there is an off position to shut it down completely.

The same is not true of the automatic headlight dipper. This accessory, long established in GM cars, is another one of those nice ideas that seem to have more shortcomings in practice than they're worth. Unique to the Chrysler line is a sensitivity adjustment on the scanner, but it still doesn't know which way the car is going (as opposed to pointing). The result is that on sweeping right-hand bends, your high-beams scorch the oncoming driver's eyeballs, dipping only as he reached the haven of darkness off your port bow.

The foot-operated dip switch will override the "eye" but unless you keep track of whether you're on auto-dip or manual dip, you may find your lights turning themselves up just as somebody new comes over the horizon at you. It's embarrassing to have your own machine make you appear rude. —*sfw*

## BMW 600

*(Continued from page 88)*

To conserve space in the original Isetta, the Dubonnet "knee-action" suspension was adopted, in which the vertical coil spring and parallel leading arms are carried outboard of the steering king-pin. It still serves in the 600 to keep the wheel housings small and thus improve foot room, but the allowable wheel travel is limited and frequently baffled by bigger-than-usual bumps. As would also be expected, the small wheels (space-saving again) "find" more bumps to be baffled by, but their light unsprung weight allows the shocks to keep them under control. The ride is probably best in the back seat, just between the wheels, while the front seat occupants do sit almost over the front wheels.

When this little BMW gets well under way its all-independent suspension proves very roadable indeed, lending surprising stability and controllability to a car which is unorthodox even by German standards. A small anomaly is a fundamental understeer in spite of 57 percent of the weight on the back wheels with the driver aboard, explained at least partially by the ground-level roll center and wider tread at the front. It lends the car a stubborn directionality which allows corners to be entered with great abandon. If the abandon is excessive and can't be compensated by the excellent steering lock, the tail can be brought around at the limit. The forward driving position is no handicap at all to good handling, but there is a certain top-heavy feel that starts to become important when the outer front wheel (in a corner) nears the end of its modest travel.

With the Dubonnet layout the steering is fully suspended, so the simple linkage is completely isolated from road shock and can be geometrically perfect. The very smooth feel that results escapes being "dead" in this case, thanks in part to the strong caster action that's been supplied. Only slightly less impressive are the brakes, which are so progressive in action as to feel underpowered at first acquaintance. They're up to the car's performance but not much more. Hard applications at low speeds, as in traffic, can cause alarming nose-dipping, though always in a straight line.

It's not strictly true to say that the 600's powerplant is stolen directly from the BMW cycle department. The famed R68/69 series gets a displacement of 592 cc with a bore and stroke of 73 x 72 mm, while the 600's dimensions of 74 x 68 mm reveal that the latter uses the crankshaft of the 494 cc R50 with a bigger bore than the R68 to get a capacity of 582 cc. The cycles deliver 28 and 35 horses in touring and sports tune, while the 600 is held to 19.5 bhp to suit the German horsepower tax situation. For rallies and suchlike BMW goes to twin carbs and many (permissible) mods to get about 35 bhp from the 600 engine.

Starting is a silent cinch with the Bosch Dynastart unit, though the choke must be deactivated *instanter* once the twin pops into life. Aided by flexible mounting and remote location, the smoothness of the BMW's engine is really impressive. Its idle is tangible but not obtrusive, while it has

but one important vibration point very low down in its speed range. On the road it makes itself heard as a pleasing Porsche-like rumble from the rear, promising much more power than is there but not offending in doing so. As is usual in such detuned rigs the 600's cruising speed is distinguishable from its maximum only by a heavier throttle spring and a couple of miles per hour, 60 being maintainable day in and day out plus a bonus on any downhill stretch.

Of course acceleration is far from breathtaking but the gearing is so good and the engine so willing that there's a combination for every circumstance. Synchromesh gives quick access to each of the four well-spaced cogs, the lever being conveniently close to the driver's right knee—so close in fact that the knob conflicts with the right shin in reverse and second slots. Most driver will find that third gear will be as high as they care to go in downtown traffic, since fourth gets rough below about 20 mph. The clutch is smooth and decisive on starts but is less equal to the repeated speed shifts I imparted during performance testing or would impart in a race.

The BMW folk proudly say that the 600 is "bigger inside than outside". It's certainly laid out to make use of every square foot of ground it covers, and the resulting shape is, if anything, more efficient aerodynamically than the conventional form. The only items within the car that give an impression of smallness are the foot pedals, which take some getting used to even for confirmed small-car drivers. Capable, solid and sincere, BMW's 600 makes not one claim that it can't back up to the hilt. *—KL*

### *Borgward RS*

*(Continued from page 53)*

rods may soon be used in a production Borgward, Brandt said. For the RS engine they're polished to a chromelike finish that smooths out stress raisers and renders the big end split nearly invisible.

Definitely out of the ordinary is the finely-detailed silumin block/crankcase casting. Additional bracing of the main bearing areas is supplied by extending the crankcase skirts well below the crank centerline, but the two-bolt main caps are laterally located by pins instead of the convenient crankcase walls. With a light alloy block this configuration entails no weight penalty, and effects a strong union with the gearbox bell housing. The cylinder head studs penetrate the block to do double duty as main bearing cap studs. The pressure oil input to the full-flow filter and the supply gallery for the main bearings stand out like the arteries they are on the left side of the block just below the access plate which, it must be admitted, gives access only to a breathing chamber vented to the crankcase through eight small holes and to the outside through a single pipe (likewise on the right side). These covers and the valve gear access plates are made of magnesium.

During 1956 the RS was equipped with a wet sump lubrication system, the six quarts of oil being circulated by a pump

*(Continued on page 92)*

## *Borgward RS*

*(Continued from page 91)*

driven by a vertical shaft and skew gears from the crankshaft nose. Consistent trouble was had with the front main bearing, which led to some serious second thoughts on the basic design of the RS, but it developed that oil was leaving the pickup on turns and was getting excessively foamy, so for these reasons — not because of unbearable oil temperature or unwanted engine height — a ten quart dry sump system was installed. The new shallow cast oil pan slopes to a central screened pickup connected by cast-in piping to the scavenge pump housed in the lowest part of the deep cam drive cover. Scavenge and pressure pumps are placed at the right and left respectively, the extra length of the gears of the former being accommodated by a deeper exterior pump cover. Both pumps are turned at about 0.6 engine speed by a straight spur gear at the crank nose.

With the reasonable exception of the connection to the injection pump, literally every oil line in the RS engine is designed and drilled in place for maximum simplicity and security. The film block oil cooler is placed in the line from the scavenge pump to the reservoir, so that it needn't be subjected to full delivery pump pressure, as is the case with so many dry sump layouts. Oil returns to the pressure pump and the adjacent filter via direct hose from the bottom of the cylindrical tank, which also provides a comforting reserve if excessive oil consumption chances to develop.

Centrifugally cast iron liners are sunk "wet" into the block, fitting very tightly at the bottom but being embraced by twin 0-rings just in case. About an inch below a flange at the top of the liner, eight "feet" radiate out to rest on a ledge within the block, like unto the Jano construction of the Lancia Aurelia and D50, and the Dino Ferrari. All locating stresses are accepted by the heavy liner section between the flange and the feet, making distortion in the rest of the liner very unlikely. Steel inserts around the chamber openings in the graphite-coated Diring head gasket complete the sealing job.

Cooling water flows from a cast duct in the chain cover into a gallery cast along the exhaust side of the block, whence it enters the interior through drillings. It rises between the liner feet into the silumin cylinder head, which enjoys virtually hot-spot-free cooling — remarkable in view of the seven apertures puncturing the lid of each combustion chamber. Hot water finds its way out through two holes in the front of the head, jumping the gap of the chain case through two rubber-ringed tubes. Brandt's initial qualms about the water-tightness of this arrangement were happily unjustified, though other troubles did crop up just a couple of inches further on. The original wet-sump engines had an oil filler cap integrated with the water outlet nozzle, which in turn was connected to a small canister topped by the water filler cap. Circulation was bafflingly slowed by steam collecting within the nozzle and canister until the whole thing was thrown out and the water filler transferred to an extension of the wide, low radiator.

Brandt naturally wanted direct injection for his new engine, and as you recall he was previously frustrated in his desire to place the nozzle in the center of the chamber. This time, by adopting the four-valve layout he was able to achieve this. Since the smaller individual valves also weigh less than the parts for a two-valver would, Brandt could enjoy high revs without the expense and complication of desmodromics. Agreed, a four-valver itself can be complex, but this bogey has been foiled by ruthless "simplication". It can also restrict gas flow at very high speeds if the absolute valve size falls below a reasonable minimum, which the RS designer admits while pointing to the improvement it can effect in medium-range output.

Once made of steel, a quarter-inch aluminum plate has proven stiff enough to carry the sprockets, guides and intermediate idler of the two-stage double-roller camshaft drive. The general layout can be called a close-coupled version of the Jaguar model, with slack taken up by two externally-adjustable idler sprockets. A tap of a plunger in the center of each adjusting screw indicates whether any further turns are necessary. The drive was quiet and reliable after synthetic-rubber-faced guides were added and the bottom chain changed from a German brand to one of Reynold manufacture.

Though his original designs specified a conventional method of joining the camshafts to their sprockets, Brandt later learned of a new coupling comprised of two conically-tapered rings which, when pressed together by a central clamping bolt, expand to lock the cam end to the surrounding sprocket. Infinite variation of the valve timing is thus possible but, except for routine degreeing, hasn't proven worthwhile so far. Exhaust closing and intake opening points are equally disposed 42 degrees from TDC, giving 84 degrees of overlap, with the same lobe shape first fitted in '56. The steel camshafts run directly in straight bores through the detachable cam cases, the cam itself being built up into five "journals" which are compatible with their silumin surroundings.

Wide lobes contact piston-type cast iron tappets whose sides are diagonally slotted for lightness and lubrication. Actually, the bottom of each tiny follower is closed except for a central puncture by a thick-thumbtack-like insert whose head contacts the valve, and whose shank carries clearance-adjusting washers which are thus interposed between the follower and the insert head. Washer changes can be made quickly through access holes in the cam carriers. Lubricant for this machinery travels up the back of the block from the main bearing gallery to two longitudinal galleries drilled in the head proper, just below the camshafts. Individual upward drillings bring oil to the cam "journals", whence it flows out and around the tappets, special drainage drillings in the bore of the cam carrier keeping a substantial

level of oil around the lobes and tappets at all times.

Symmetrically and moderately inclined at 32 degrees from cylinder centerline, the valves are finely finished. The tuliped intakes are 33 mm in diameter (1.30 inches), while the 30 mm exhausts are sodium-cooled and have been made with both flat and partly-recessed heads as an experiment by the valve maker. A quick check shows that the gas velocity through each intake valve aperture at 7500 rpm will be 208 feet per second, a valve commendably close to the usual working maximum of 200 fps., so no undue restriction has had to be accepted here. With twin coiled valve springs rated at about 220 pounds per set, the valves stay under control comfortably at 8500 and can be trusted at yet higher revs if need be.

That oft-maligned aspect of the four-valver, the combustion chamber shape is dictated almost entirely by the components that have to be accommodated, but as Brandt says with a smile, "It didn't turn out too badly!" The basic shape is naturally pent-roof but the peak and corners are smoothly radiused as are the edges of the slightly recessed spark plug holes. Also set back from the chamber surface, the injector nozzles spray through 3/8 inch holes. The scarcity of space causes the valve seat inserts to be unusually thin-walled and deeply-set. As in some diesels in the Borgward line, the valve guides are of a bronze alloy named Cuprodur, and are pressed into place.

The angular piston crown is a good match for the pent-roof chamber, the central "ridge pole" being very slightly rounded to deflect the injector spray in just the right manner. To hinder erosion, the surface of the crown is specially treated and has a deep graphite-gray hue. Mahle forged the pistons of aluminum alloy, giving them a smooth interior finish. Originally, four rings topped the full skirt, freedom from breakage finally being obtained when two Dykes pressure-backed rings replaced the three original compression rings. Conventional wrist pins are retained by circlips.

This Borgward RS engine must be the only racing engine, if not the only automotive engine that has absolutely *never* run on carburetors. Even the M196 Mercedes engine was at least tried on carbs, a step that Brandt admits would be technically interesting but one that he's never had the time for! Here in sooth is a *bona fide* injection engine. Brandt would prefer that the engine be outfitted with carbs if it sees production, but my own feeling is that Borgward could score a thunderous publicity and commercial smash with "the first injected 1½ liter sports car". There appear to be no technical hindrances to the use of this system on the road, fuel dilution of the oil (past the rings and pump seals) staying well below a critical level. On early engines, the attaching flanges for both the injector and distributor at the back of the cams tended to crack and fall off, but hefty webbing and thicker sections have cured that.

Differing from that used in the Vanwall in that it retains the vacuum-controlled

(Continued on page 97)

## *Renault Caravelle*

*(Continued from page 39)*

topless convertible and the solid-roofed coupe. Our test car was also loaded with about 85 lbs. worth of luggage, camera equipment and tools when we made the acceleration runs and the tank was filled with European gasoline. Without all that impedimenta and the hardtop removed and tuned for American high-test the chances are good that several seconds could be pared off the 0 to 60 time.

Another gargantuan lunch, an even bigger dinner and a night later we headed back for Paris via Mont St. Michel (that towering structure in the lead photo) where we were to meet for a last lunch. This was a Sunday so we had a good chance at trying the Caravelle in traffic, the medieval fortified abbey being a tourist attraction of some note. At no time did the engine show a tendency to load up nor did it display any heating problems. Nor did it give any problem in the stop and start free-way jam outside Paris later. This despite a hotter cam and other soup including larger intake ports, larger intake valves and the 32 PIBCT Solex carburetor. This last item is fitted as standard with a #24 venturi which our test car used. If more top end steam is desired it is likely that one of the larger Solex venturis would make the difference, especially if accompanied by prudent changes in air correction and main jet sizes.

Later, after we dropped the car — somewhat reluctantly — off at the Regie Renault headquarters we sat down to figure things out. With all the pounding we had given the little car (M. Sicot had said to push it) the only sign it showed of wear was a slight hum in the lower gears. We had covered exactly 899.6 miles of just about every sort of road from freeway to country lane and back to dense city traffic and except for the fork-in-a-bowl-of-spaghetti gear selector could find little to complain of in Renault's newest offering. As for looks, the car has been a show-stopper in at least three countries and little more need be said. It's exquisitely styled and neatly executed. There are nice little touches of luxury all over that help to make the car even more pleasurable.

For the man or woman who doesn't need 100 mile-an-hour sizzle and shoulder flattening acceleration but who wants sports car handling and startling good looks coupled with economy (32 mpg flat out. 36-plus just touring) it is hard to see how anyone could go far wrong with the Caravelle.

As for ourselves, the car stood up better than did we. While we didn't fare as badly as our English friend we have a vague idea now of how a pate de foi-gras goose feels during his training period. The man was right — these French folk FEED you.

*—jpc*

**Price at East Coast POE (approximately)....$27[illegible]**
**U.S. Importer: Renault, Inc.**
**425 Park Avenue**
**New York 22, N. Y.**

### PERFORMANCE

**TOP SPEED:**

| | |
|---|---|
| Two-way average | 71.4 mph |

**ACCELERATION:**

| From zero to | seconds |
|---|---|
| 30 mph | 6.8 |
| 40 mph | 10.5 |
| 50 mph | 16.2 |
| 60 mph | 28.4 |
| Standing ¼ mile | 23.6 |
| Speed at end of quarter | 57 mph |

**SPEED RANGES IN GEARS:**

| | |
|---|---|
| I | 0-29 |
| II | 8-50 |
| III | 11-64 |
| IV | 16-top |

**SPEEEDOMETER CORRECTION:**

| Indicated Speed | Timed Speed |
|---|---|
| 30 | 27 |
| 40 | 35 |
| 50 | 44 |
| 60 | 53 |
| 70 | 61 |
| 80 | 68 |

**FUEL CONSUMPTION:** 32-36 mpg

### SPECIFICATIONS

**POWER UNIT:**

| | |
|---|---|
| Tuned Dauphine | Water-cooled, in-line four |
| Valve Operation | Pushrod ohv, in-line |
| Bore & Stroke | 2.28 x 3.15 in (58 x 80 mm) |
| Stroke/Bore Ratio | 1.38/1 |
| Displacement | 51.5 cu in (845 cc) |
| Compression Ratio | 8.0/1 |
| Carburetion by | One Solex 32 PICBT |
| Max. Power (SAE) | 40 bhp @ 5000 rpm |
| Max. Torque | 47.7 lbs-ft @ 3300 rpm |

**DRIVE TRAIN:**

| Transmission ratios | | (overall) | optional ratios |
|---|---|---|---|
| I | 3.70 | 16.2 | (3.70 ) |
| II | 2.10 | 9.2 | (1.80 ) |
| III | 1.46 | 6.4 | (1.035) |
| IV | 1.035 | 4.5 | |
| Final drive ratio | | 4.37 | |

**CHASSIS:**

Dauphine frame of welded pressed steel

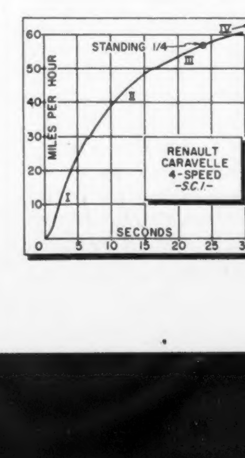
| | |
|---|---|
| Wheelbase | 89½ in |
| Tread, front and rear | 49, 48 in |
| Front Suspension | Independent |
| Rear Suspension | Independent |
| Shock absorbers | Telescopic |
| Steering type | Rack and pinion |
| Steering wheel turns L to L | 4½ |
| Brakes | 9 inch drums |
| Brake lining area | 82 sq in |
| Tire size | 145 x 15 |

**GENERAL:**

| | |
|---|---|
| Length | 168 in |
| Ground clearance | 7 in |
| Curb Weight | 1720 lbs |
| Weight, as tested | 2050 lbs |
| Weight distribution, F/R as tested | 41/59 |
| Fuel capacity | 8½ U.S. Gallons |

**RATING FACTORS:**

| | |
|---|---|
| Specific Power Output (SAE) | 0.78 bhp/cu in |
| Power to Weight Ratio, as tested | 51.2 lbs/hp |
| Piston speed @ 60 mph | 2100 ft/min |
| Braking Area, as tested | 78 sq in/ton |
| Speed @ 1000 rpm in top gear | 15.0 mph |



## *Play Your Ace*

*(Continued from page 65)*

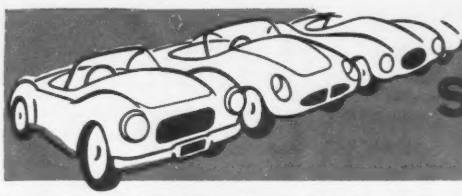
must for those in search of utmost output, specially in combination with air straighteners and 140 to 145 main jets. This noisy plumbing uses downpipes and dual tailpipes if 1¾ and 2 inches outside diameter respectively, and has a side outlet ahead of the rear wheel.

Bristol engines are sensitive to interrelative pushrod weights and valve spring strengths. Rudd, exploiting an AC dealer's prerogative, and being conveniently based within fifty miles of the factory, makes up exactly matched sets of springs and rods from batches of five or six dozen.

The ignition distributors fitted to Aces and Acecas sometimes develop play on the rotor arm bearings after quite a small mileage, allowing the cams to float at high revs, with resulting alteration in the sparking gap. If the distributor shows any sign of movement on the central boss, replace it or have it reconditioned. In Rudd's case, and presumably others, Lucas have in the past supplied a superior quality substitute distributor that eliminates this fault. As an alernative, Delco Remy make an excellent instrument with dual contact breakers, which is provedly capable of standing long periods of hard work.

Bristol engines are of course broken in before you get to buy them, although it is Rudd's personal experience that they are in their prime after about 15 hours' running, or say 3000 miles. With this operational time or distance under their rockerboxes, typical ones (9/1 compression version) have shown 128 bhp on the Rudd dynamometer; this is 3 bhp up on the makers' claim. The weekend before I toothcombed — and briefly drove — VPL442, the car had done its first competition of the '59 season, a hillclimb, calling for screaming bursts of revs in the gears; and immediately before *that*, after a mileage of 68,000, it had had a complete engine overhaul entailing the renewal of pistons, main and bigend bearings, etcetera. This gives a telling indication of the Bristol's voracious appetite for hard work immediately following a rebuild, and its invulnerability to savage usage during this ordinarily critical period.

Among other interesting abracadabra we stumbled on in a quiet corner of the Rudd premises was a mouth-watering ensemble comprising a Bristol cylinder head fitted with three dual-choke Solexes. Bristol themselves, you may remember, used a topgallant of this type when they raced at Le Mans and elsewhere a few years back, although the example unearthed at Worthing was a Rudd production. The crux of the deal is the battery of specially cast adaptors nestling between the carbs and the ports. These, cast in light alloy, were produced to Ken's own moulds, and they probably differ in detail from those made at Bristol for the company's own edification and fun. Rudd's firm had done some tentative development on the six-throat setup, arriving at two main conclusions:— 1) It would likely raise maximum output to 160 bhp or thereabouts; 2) It would be strictly for millionaires at the sort of price they'd have to charge. — *D M*



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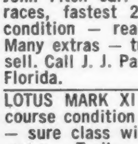
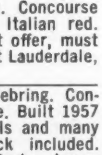


## EQUIPMENT



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## *Borgward RS*

*(Continued from page 93)*

metering system, the four-plunger Bosch pump inclines steeply to the right and doses the cylinders through conventional copper piping at pressures of from 1000 to 1100 psi. A rear-mounted electric fuel pump backs up the integral mechanical pump and facilitates starting. As in all the Mercedes installations, the big Bosch throttle chamber admits air to a cylindrical balance box which feeds individual slightly-curved ram pipes, their center sections being of hose to reduce vibration transfer and also to allow quick changes of ram tube length to suit the course. The polished oval intake ports split into paired valve openings just as late as the designer dared without prejudicing the strength of the center pillar and, thus, the valve seating. Injection starts at 62 degrees after TDC.

Similarly-treated exhaust ports disgorge into big pipes arranged in the now-common scavenging layout, the final junction taking place in the "silencer" slung under the right-hand door. It's no secret that most of the great improvement in output since this engine delivered 130 bhp in its first runs has been gleaned from refinements in intake and exhaust tuning. When the first Cooper installation was made, for example, just for fun they tried the exhaust system exactly as used on the Climax, and recorded a thumping 128 horses on the dyno. Naturally, such systems must be individually tailored not only to individual types of engines — even within the 1½ liter bracket — but to individual *engines* as well.

Also by Bosch, the distributor is specifically tailored to a life at high revs. Two bearings support the shaft close to the breaker cams, while the cover is bolted in place. One of the World's Smallest Generators is mounted at the left of the block, driven very ordinarily by a fan belt which also turns the water pump. Coolant temperature usually runs around 80 degrees C. without a thermostat, though the pressure cap allows 105 degrees with safety.

The sturdy construction of Brandt's brainchild is reflected in its weight of 282 pounds. While maximum output is rated at 7500, the engine can be held at full throttle on the dyno for as long as ten minutes at 8000 revs. As fitted to the Borgward sports cars, this power was delivered through a hydraulically-operated Borg and Beck twin-plate clutch within a magnesium bell housing. Native Fichtel and Sachs clutches were tried without satisfaction. Totally special, the aluminum alloy case of the gearbox houses five forward speeds. The top four gear sets are helical and are engaged by ZF blocking-type synchromesh, the ratios not being easy to alter. It's very easy to get from one to the next, however, thanks to a simple guiding mechanism at the shift tower that facilitates fast "across-the-gate" shifts.

Since the Coopers also used Borg and Beck clutches, this aspect of the "swap" was easy, and the prototype installation on the 1957-type Walker car naturally didn't

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## *Amalgamated Pizza*

*(Continued from page 67)*

Dino was on the top of the world. Then, on a rainy Tuesday in March he arrived in his office to find three letters on his desk. Even Dino the empire builder paled when he read the first one.

It was from the Government Anti-Trust commission. Uncle Sam was ordering Amalgamated Pizza to cease and desist. Since Amalgamated Pizza was now selling 99.4% of all new cars in the country (the other .6% were Pignatelli based specials), it was a clear case of monopoly. The subpoena was answerable in three days.

The second letter made Dino wince. It was a statement from the Amal-Pizza stockholder's committee. They disagreed with Dino's favorite V. P. of Cost Accounting, and claimed that Amalgamated Pizza was indeed selling 99.4% of all the cars — at a net loss of $10,051.23 per car. They figured that the company had lost to date some 391 billion dollars.

The third letter was much shorter. It was just a slip of plain white paper, slightly soiled. It was marked with a crudely drawn Black Hand and signed "best regards, Charlie." Dino hadn't figured on this. But he should have. For when Amalgamated developed that fabulous small car, the American market for Gran Turismo Pignatellis was entirely wiped out. And how could Charley Lucky continue his profitable import business without cars in which to stash the kilo packages of powder?

They found the three letters on Dino's desk the next day, but they never found Dino.

The stockholders' committee took control. They dropped the hot Pizza and formed Amalgamated-in-Receivership Inc. The fabulous Pig was discontinued. Uncle Sam dropped the anti-trust suit. And Ford came out with a 22 foot monster 2 seater with four tail fins and six headlights. It swept the market.

There are rumors, though, that Big Dino isn't dead. That he'll be back, back with an even more fabulous car. There are people who claim to know where he is right now. At any rate, there *is* a longshoreman on one of the Brooklyn docks who looks enough like Dino to be his twin brother. *—rl*

## *Borgward RS*

*(Continued from page 97)*

have to contend with the pair of spur gears between clutch and box in later Coopers. Certain of the English cars will have been fitted with special gearboxes by Colotti, sometime chassis designer at Maserati, in conjunction with the special box for the Cooper-BRM. Certainly this across-the-channel cooperation will have given the Borgward RS engine a well-deserved new lease on life, but I think the factory's 1961 plans will take care of the long-term aspects equally well. Brandt and Büchner are probably already working on the problems of oil drainage in a steeply-inclined engine. There'll be nothing dull about a 1½ liter formula with competitors like Borgward aboard. *—kl*

## INDEX OF ADVERTISERS
## Sport Cars Illustrated
## August 1959







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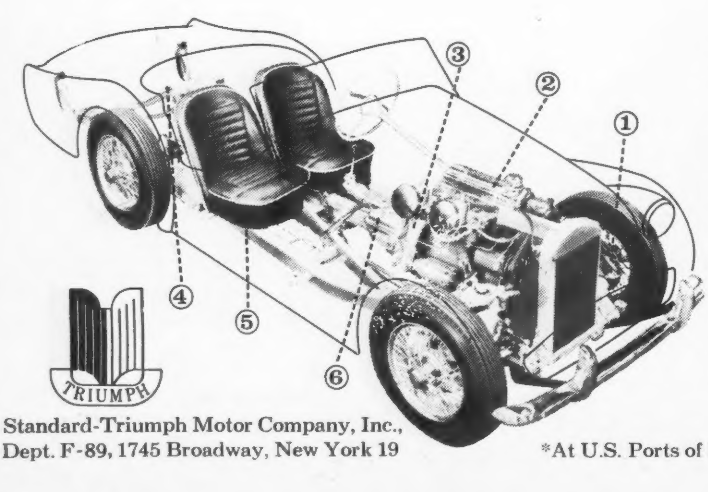


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